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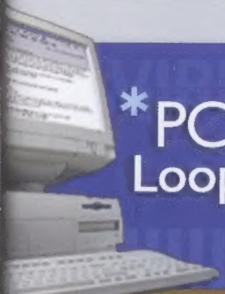

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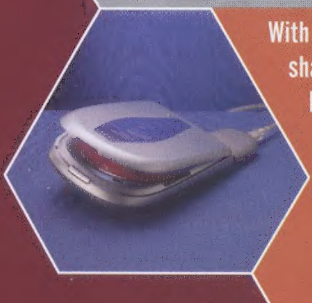

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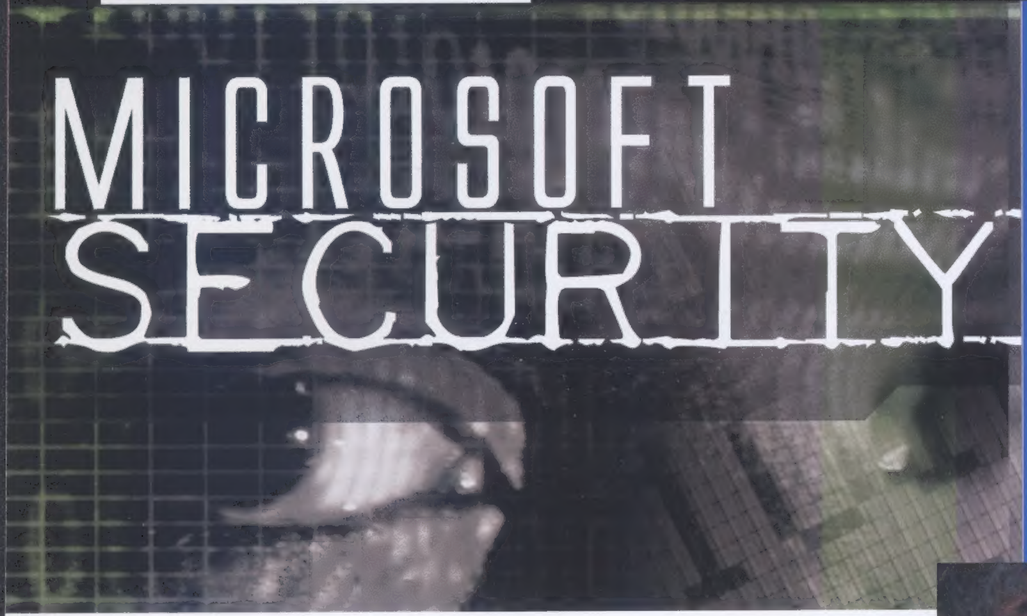

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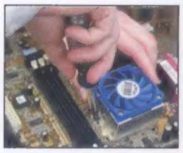

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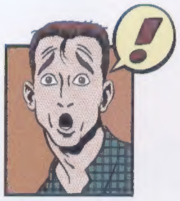

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Strange stats and other oddball items from computing's periphery.

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GREETINGS FROM SAMITLAND

Welcome back, mis compadres. We're sweating it up with the summer heat here in good ol' Lincoln, Nebr., but I don't mind too much. The heat gives me a great excuse to stray from my exercise program. Less exercise = more time to stay indoors with my PCs. Heh.

So did you see our coverage on DivX (pg. 46 in last month's issue)? Yeah, me, too; and with all this extra time on my hands I started playing around with DVD Copy Plus (www.321studios.com), which lets you make VCDs (VideoCDs) from your DVDs. It's a great idea for those of you who don't want to take your DVDs on the road or who want a disposable copy for the kids to play around with, but it's not really the one-button copy package I had envisioned. Besides, the process can easily take half of your P4/1.5GHz computer's day with some of the high audio-video quality options turned on. Check out our full review next month. In the meantime, join us this month for "Back Door" on pg. 108 where we chat with the creator of DivX: Gej.

Onto a slightly different topic: Security. This has been a hotly debated issue, and we decided to spotlight what's happening on the Microsoft front (beginning on pg. 54), especially in light of Bill Gates' comments to his employees about the importance of security. We also take a look at several other security aspects, along with products that will help keep your PCs safe.

That's about it for this month. By the way, we've been getting some valuable article ideas from your comments, so thanks. Please do keep them coming. We want to keep hearing what you love and hate about the issues as we strive to create the perfect publication for you, our reader. I hear Dungeon Siege calling my name, so it's time I relinquish the podium. See you next month.

Samit G. Choudhuri, Publication Editor, *CPU*

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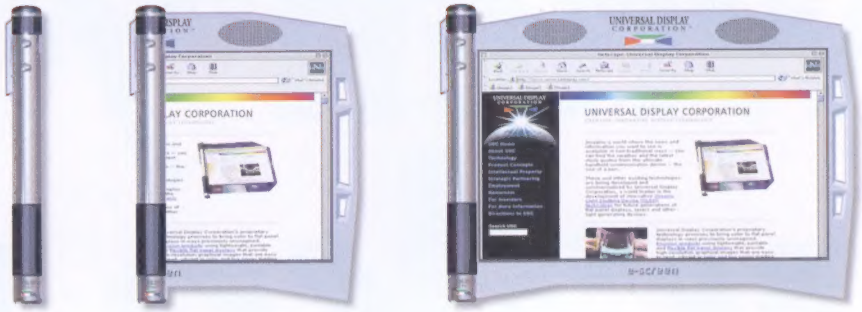
In Hardware . . .

Just One Word: Plastics



It turns out the businessman in "The Graduate" was right: Plastics are the future, and not just because most plastics refuse to biodegrade. Manufacturers have made great strides in making stronger, thinner, lighter-weight plastics. Now Universal Display Corporation is leading the OLED (organic light-emitting diode) revolution with small, flexible, full-color displays in plastic substrate for use in automotives, the military, and the display industry.

Pioneer first commercialized OLEDs for automotive and cell phone devices. Last year Sony unveiled a 13-inch full-color OLED display, and Samsung took up the gauntlet and produced a 15-inch model. Now a "wide variety of other companies are fast and furiously building manufacturing capacity," says Janice Mahon, vice president of technology commercialization for UDC. Sony's and Samsung's large-screen OLEDs aside, "most companies are really starting with smallish displays in both passive and active matrix configurations for monochrome and full-color applications."

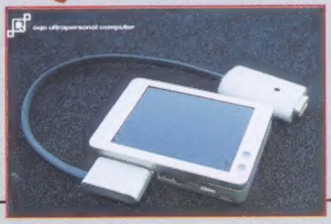
Today's OLED displays have better contrast ratios than reflective LCDs but have a way to go before they'll compete with high contrast LCDs in extremely bright light. One major benefit OLED displays have over LCDs is flexibility. "Most flat-panel displays are built on glass," says Mahon. "There have been some attempts to make LCDs on plastic substrate, but they haven't been tremendously successful because one critical design issue is maintaining the cell gap between the two pieces of substrate. In a plastic environment it's very difficult to maintain a precise distance between one and the other, particularly as you bend or contort the substrate."

By contrast, OLEDs are constructed on a single substrate, with the second substrate used for protective purposes. How far away are devices such as the rolled-up electronic newspaper or the rollout, pen-sized display? Mahon says some of those ideas are a few years away. "We are in the process of beginning some real design work in this area, but . . . most of the components required to make that device operate do exist today. It's the display, from a full-color, high-resolution perspective, that still needs to be achieved."

Looking forward one or two years, full-color, relatively inexpensive OLED displays should start showing up in an increasing number of handheld devices such as cell phones. And video rate OLED displays on plastic are already a reality. Dick Tracy-style device designers have only to overcome engineering obstacles before prototypes start drawing crowds at computing trade shows. For now, UDC is poised and ready with the OLED piece of the puzzle.

Battle Of The Smalls

Watch your step! There are at least two ultra-small PCs hitting the market this year, each running Windows XP. PaceBlade Technologies' PaceBook is available now for $1,995; OQO's OQO is set for release late this year and will allegedly cost about $1,000. Here's a look at how the PCs' specs compare:



	OQO	PaceBook
Dimensions (inches; H x W x D)	1 x 5 x 3	1.1 x 9.7 x 13
Processor	Transmeta Crusoe TM5800, up to 1GHz	Transmeta Crusoe 5600, 600MHz
Memory	256MB	128MB, expandable to 640MB
Hard drive	10GB	20GB
Optical drive	None	DVD-ROM
Display	4-inch VGA color LCD, can dock with full-sized monitor	12.1-inch XGA color LCD, can dock with full-sized monitor
Video memory	Unknown	8MB
Battery life	Unknown	Five hours
Input	Touch screen, can dock with keyboard	Touch screen or keyboard
Company's spin	"The only computer most people will ever want or need."	"Has all the benefits of a traditional notebook computer but none of the disadvantages."

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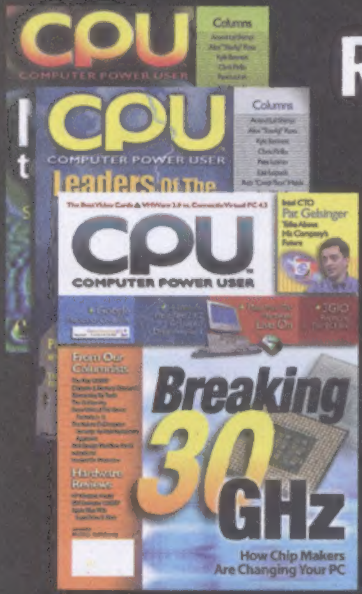

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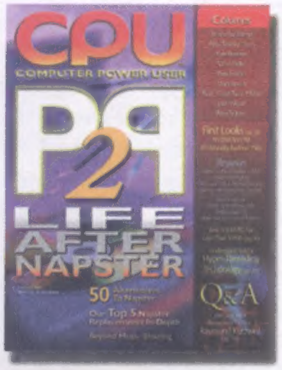

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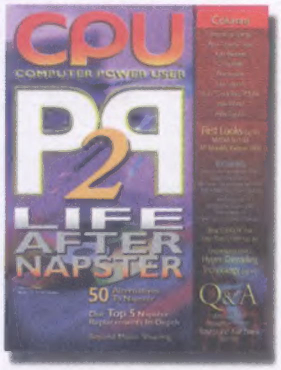

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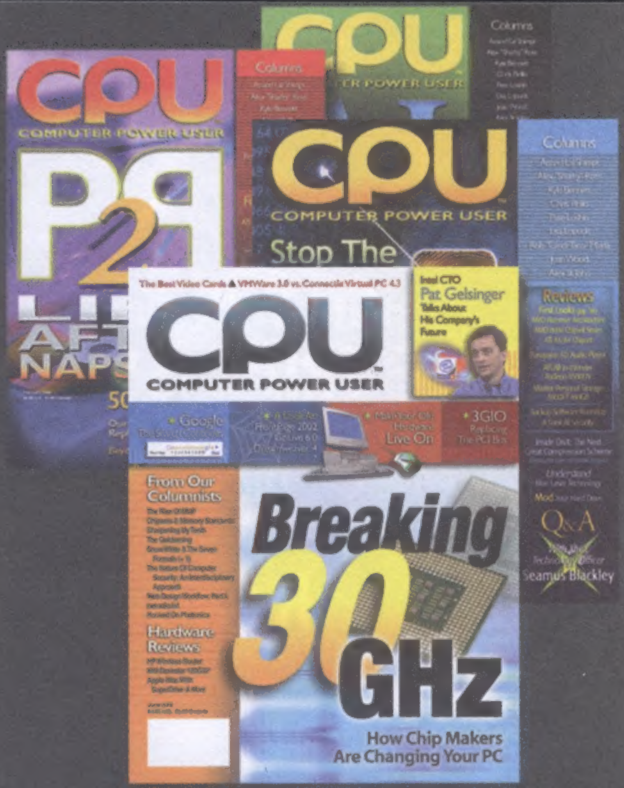
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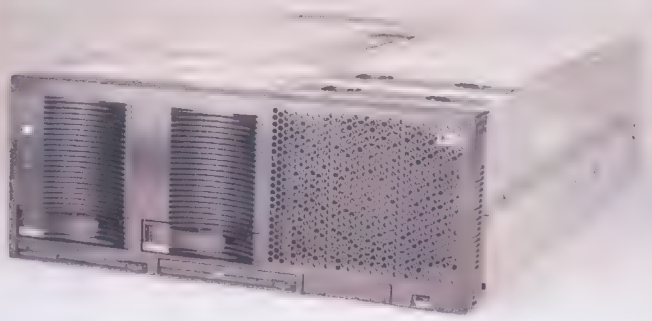
Care To Super Size Your Server?

The x440, the latest server in IBM's eServer xSeries, doesn't reinvent the wheel, but it does smite the competition with a median price tag (around $50K) that's less than comparable servers from Sun and Unisys. The x440 contains up to 16 Intel IA-32 Xeon Processor MPs (although you can start with four and add on four at a time as your processing requirements grow) and up to 64GB of SDRAM. It can run any combination of Windows and Linux OSes. The $50K gets you an eight-processor version with 16GB of SDRAM.

IBM touts its new eServer x440 as being more scalable than the competition.



IBM is gearing the x440 toward cost-cutting businesses that want to run a large database or multiple virtual servers from one box. According to IBM product marketing manager for the eServer xSeries Jay Bretmann, IBM doesn't plan to extend IA-32 machines to 32-way symmetric multiprocessing, but the company is pursuing that type of scalability for future McKinley machines. "However," says Bretmann, "IBM expects its 16-way to give it several months, or even several quarters, lead over rivals, who are now unveiling eight-way configurations for Intel-based services." IBM will begin shipping the x440 in July.

Hardware Mole

Here are a handful of morsels our hardware mole unearthed before press time.

The Addonics DigiDrive reads and writes in seven different memory card types

Swiss Army Knife Or Addonics Drive?

With its latest USB flash memory card reader, Addonics proves it can match the Swiss Army's dexterity for producing multifunctional devices. The new DigiDrive, an internal drive that fits into a desktop PC's 3.5-inch drive bay, reads and writes at a rate of 1MBps and supports—count 'em—seven cards: CF-I, CF-II, Memory Stick, Micro Drive, Multimedia Card, Secure Digital Card, and Smart Memory. You can connect the drive to any internal or external USB 1.1 or 2.0 port on a machine running Win98SE/Me/2000/XP, Mac OS 8.6 or later, or Linux 2.4 or later. The DigiDrive costs $69 and is available from major online retailers.

Apple Consumes FireWire

Apple recently staked a deeper claim in FireWire, the ultra-fast IEEE 1394 implementation it invented in the mid-'90s, by acquiring Zayante, a company that makes FireWire-compliant software and chips. Ex-Apple employees founded Zayante in 1996. Zayante president and CEO Prashant Kanhere now joins Apple to further promote the technology that's otherwise known as FireWire.

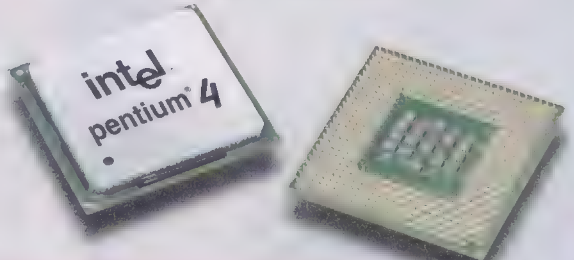
Sharp Breaks 60X

In Tokyo, Sharp recently announced that its forthcoming optical chipset, code-named GA100T8R6MZ, will enable CD-R burn speeds of up to 60X, a marked increase over the current top of around 40X in consumer drives. Devices using the chip will also play CD-ROMs at 60X and DVDs at 16X. However, we've yet to see whether the 60X CD-R capability will relay to significantly faster results during practical use and whether manufacturers can build such drives without detrimentally increasing vibration and noise. The chipset should be available in Japan by the time you read this, and devices might be available by the end of 2002.

Chip Watch

In the April (ak.a April Fools') issue of *CPU*, we wrote a prank about a Web site called ChipWatch.com that we said offered the latest processor news and roadmaps. Many of you fell for it and enjoyed a chuckle, and some of you expressed high hopes that something like it exists. So, although we can't match the "updated daily" capabilities a Web site provides, we've decided to bring you a page of the latest chip news. Enjoy!

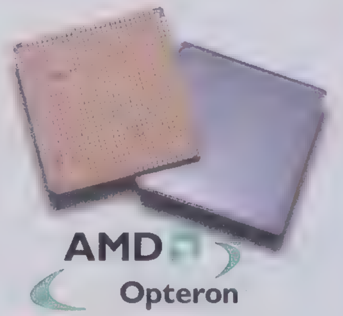
On The Heels Of 2.6GHz



The latest Pentium 4 chips hit 2.53GHz.

You speed demons following the rapid escalation of Intel's Pentium 4 processors will be glad to know that the company recently released the latest models: Pentium 4 processors, each with a 512KB L2 cache 533MHz system bus (every previous model had a 400MHz bus) and operating at speeds of 2.2GHz, 2.4GHz, and 2.53GHz. The Intel press machine announced the latest release with comparisons to processors of a year ago, claiming that the Pentium 4 chips provide a 40% performance boost for 3D gaming. However, the company has said little that sets the latest set apart from the 2.4GHz chip with 400MHz bus unveiled in April. The chips are available for $423 (2.2GHz), $562 (2.4GHz), and $637 (2.53GHz) in 1,000-quantity units. ▲

Opteron: The Dawn Of x86-64



AMD's "SledgeHammer" is now the "Opteron."

According to a recent announcement, AMD is poised to deliver the first processor using x86-64 technology, which will run current 32-bit apps as well as 64-bit apps. Built on AMD's eighth-generation processor core, formerly code-named "SledgeHammer," the new processor, dubbed the Opteron, is scheduled for release during the first half of 2003. The Opteron will use HypterTransport technology and should ratchet server system bandwidth speeds up to 19.2GBps. AMD also announced that Microsoft and unidentified "major Linux vendors" will include in their OSes 64-bit support for the Opteron and future Athlon processors. ▲

Out With The Old

nVIDIA
g-FORCE 4
Ti
Say bye-bye to the GeForce4; NVIDIA's next effort is right around the corner.

On Feb. 6 NVIDIA debuted the GeForce4 GPU line, just a couple weeks short of a year after the company debuted the GeForce3 line. Now, according to NVIDIA CEO Jen-Hsun Huang, NVIDIA is gearing up to release the next GPU as soon as August. Reportedly, the new GPU will be built on a 0.13-micron process; GF4 chips are currently built on a 0.15-micron process. ▲

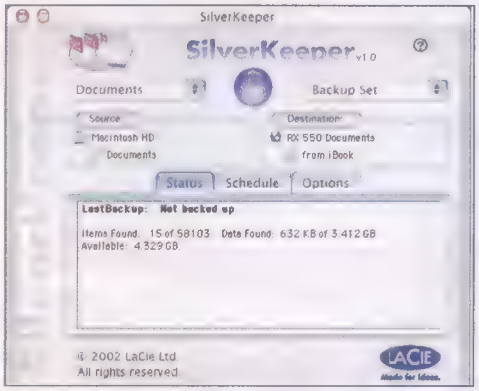
Watching The Desktop Processors Roll By

Here is the latest rundown of Intel and AMD recent releases and future goals.

AMD Athlon XP 2000+, 1.67GHz Intel Pentium 4, 2.2GHz AMD Duron, 1.3GHz, 192KB on-chip cache, 200MHz FSB	January 2002
AMD Athlon XP 2100+, 1.7GHz, last processor built on the Palomino core	[illegible] 2002
Intel Pentium 4, 2.4GHz	April 2002
Intel Pentium 4, 2.53GHz	[illegible] 2002
AMD Athlon processor code-named "Barton," with a 512KB L2 cache, to be built on a 0.13-micron process Intel to release Pentium 4 processors with speeds greater than 2.53GHz	July–December 2002
AMD Athlon eighth-generation SOI (system-on-insulator), code-named "ClawHammer," to be built on a 0.13-micron process Intel to release [illegible]GHz Pentium 4	2002/2003
AMD Athlon "ClawHammer" SOI to be built on a [illegible]-micron process	[illegible]

Back Up Your Mac

LaCie, a company that has enjoyed enduring success in the cross-platform storage arena, recently released shareware that's sure to make Mac users smile. SilverKeeper 1.0, backup software for Mac OS 9.x/X.x, is already bundled with LaCie storage devices, and now the software is freely available for download from www.silverkeeper.com. According to LaCie, SilverKeeper works with any Mac-friendly internal or external storage device, including hard drives, optical drives, and removable drives. That includes drives with ATAPI, IDE, SCSI, FireWire, and USB interfaces; it also includes CD-R/RW and DVD-R/RW/RAM optical formats but doesn't include the Mac-unfriendly DVD+R/RW formats. ▲



Documents
Backup Set
Source: Macintosh HD Documents
Destination: RX 550 Documents from iBook

LastBackup: Not backed up

Items Found: 15 of 58103 Data Found: 632 KB of 3.412 GB
Available: 4.329 GB

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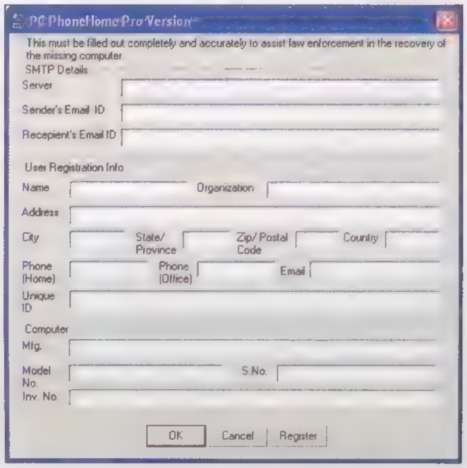
LaCie's SilverKeeper lets Mac users schedule unattended file backups.

PC Phone Home

Don't bother using Reese's Pieces to draw your stolen PC out of the hands of thieves. Trust us; it doesn't work. However, Nanuet, N.Y.,-based Brigadoon Software now has a useful tool: PC PhoneHome Pro. Available for $29.95 direct from Brigadoon, PC PhoneHome Pro tracks your stolen PC and sends you a "stealth" email message indicating the computer's location. The software runs on Windows and Mac systems.

Once installed, the software isn't accessible through ordinary means—it doesn't show up in the Task Manager or in Windows Explorer—and stays persistent even when a thief runs FORMAT or FDISK commands. To remove the software, you must be a registered user and obtain an uninstall program from Brigadoon.

If your computer is stolen, and PC PhoneHome has been properly installed, the software sends an email message your way as soon as someone connects the PC to the Internet. From the message you can derive the date, time, and IP address from which the message was sent. You can then access Brigadoon's site; click the Tracking link; complete the IP Lookup Form; and obtain the name, address, and contact information for the thief's ISP. The software is also available in a less intelligent shareware edition called PC PhoneHome Lite and in a multi-license edition for schools and governments called PC PhoneHome Enterprise. ▲



This must be filled out completely and accurately to assist law enforcement in the recovery of the missing computer.

Fill in the blanks and, if your desktop or notebook PC gets stolen, PC PhoneHome will help you get it back.

Software Shorts

Sometimes all the news simply doesn't fit, but here are a handful of items we squeezed in just for you.

Solaris 9 Might Be Intel-Friendly After All

Sun Microsystems announced in January that its newest OS, Solaris 9, would not support Intel processors. Solaris has traditionally been Intel-friendly: Solaris 8 supports Sun's 64-bit UltraSPARC chips as well as Intel's 32-bit Pentium chips. Sun cited cost as a factor, but analysts had nailed the move as flat-out antagonistic. Three days after the announcement, Sun seemed to buckle under the criticism, saying it would reconsider the move. For now, the Solaris 8 binary is available for the cost of media, shipping, and handling, and Solaris 9, which at press time was still an UltraSPARC-only proposition, is available as a beta release called Solaris 9 Developer Early Access.

With 1.2 million licenses and counting, Intel-friendly Solaris 8 keeps rolling.

Viewpoint Media Player Available For Macs

If you're a Mac user looking for a browser-integrated media player, check out the newly released Mac version of Viewpoint's VMP (Viewpoint Media Player), a free download from Viewpoint's Developer Central Download page. The VMP works as a browser plug-in for both Internet Explorer and Netscape.

McAfee Targets Active Worms & Viruses

ThreatScan, the latest software from McAfee, is now available for networks running WinNT Server 4.0 SP5 or later, Win2000 Server, or Advanced Server SP1. The software scans networked systems running just about any Windows, Solaris, Unix, Linux, or Mac OS and devices such as printers and routers for infectious agents such as worms (think Nimda) and viruses (think ILOVEYOU) and removes them before they spread across the network. The beta version is available for download: Go to estore.nai.com, click Try Products, choose your locale, and find ThreatScan in the McAfee list.

Language Of The Web

English remains the dominant language on Web pages—68.4% of Web content is in English—but it seems that non-English tongues are rapidly gaining Internet access. According to research completed this spring by Global Reach, 40.2% of the world's online population speaks English. If the projection for 2003 holds true, next year that figure will shrink to 34.6%.

	English Speakers	Non-English Speakers
2002		
Number (in millions) with Internet access	228	339
Percentage of world Internet population	40.2%	59.8%
2003, projected		
Number (in millions) with Internet access	270	510
Percentage of world Internet population	34.6%	65.4%

For the most part, economics and Internet access go hand in hand.

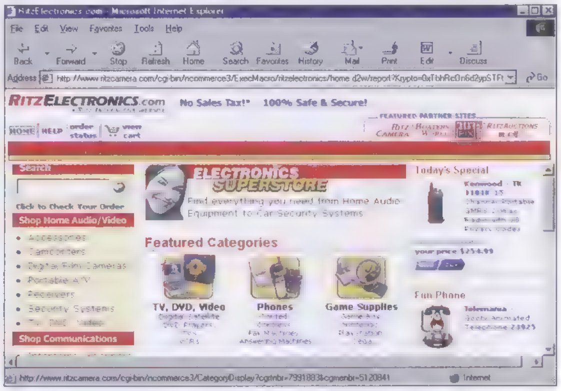
Language Spoken	Percentage Of World Internet Population	Percentage Of World Economy
English	40.2%	33.4%
Chinese	9.8%	13.0%
Japanese	9.2%	8.0%
Spanish	7.2%	8.9%
German	6.8%	5.8%
Korean	4.4%	2.0%
French	3.9%	4.2%
Italian	3.6%	3.6%
Portuguese	2.6%	3.6%

New On The 'Net

Looking for some new surfing destinations? Here's a sampler of the many sites that recently hit the Web.

Electronics From The Ritz

Didn't think you'd need another online electronics superstore? Neither did we, and even after visiting the new RitzElectronics.com, we're still not convinced. RitzElectronics.com offers pretty much the same fare you'll find when visiting BestBuy.com and similar e-tailers, so its success will probably depend upon how it prices its products. As you might expect, RitzElectronics.com didn't spring from nowhere. It's the latest shopping site from Ritz Interactive, and it joins a collection of sites that includes RitzCamera.com, Boatersworld.com, and RitzAuctions.com. For some reason we're hungry for crackers now. Ritz crackers and transistor dip, anyone?


RitzElectronics.com - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss
Address http://www.ritzcamera.com/cgi-bin/ncommerce3/ExecMacro/ritzelectronics/home.d2w/report?Krypto=0xTbhRc0n6d2ypSTFt
Go
RITZELECTRONICS.com
No Sales Tax!* 100% Safe & Secure!
FEATURED PARTNER SITES
HOME HELP order status view cart
Search
Click to Check Your Order
Shop Home Audio/Video
Shop Communications
ELECTRONICS SUPERSTORE
Featured Categories
TV, DVD, Video
Phones
Game Supplies
Today's Special
your price $254.99
Fun Phone
Internet

Find everything you need from Home Audio Equipment to Car Security Systems

RitzElectronics, an online electronics superstore, recently made its Web debut.

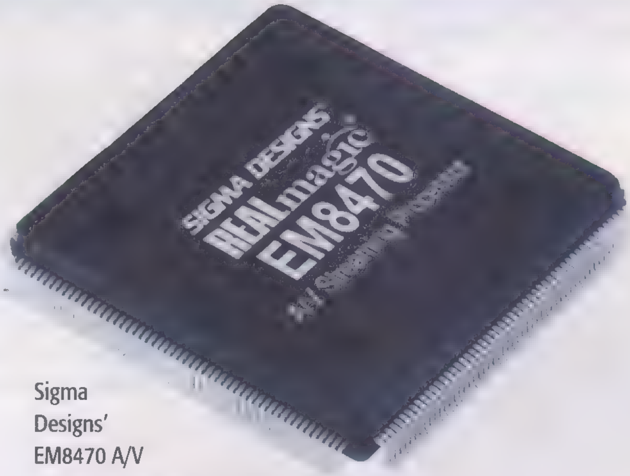
Shareware: Simple As 1-2-3

Actually, this is the only site we know of that's simple as 1-2-3 and A-B-C simultaneously. A1B2C3 (www.a1b2c3.com) has arrived on the shareware scene with a software-packed, bare-bones Web site filled with download possibilities. Categories include A/V (for multimedia software), Computer (system utilities and interface software), Games, HTML (editors, search engine software, and more), Internet (browsers, email, FTP software, and more), and Reference (business-related and miscellaneous software). We clicked A/V and Audio, and the site delivered 61 titles, everything from the familiar (Morpheus, Winamp) to the obscure (Disco CD Player, HeadRush).

Risky Business

If you're looking for a new or used motorcycle, CycleVantage.com recently came online to help you find what you're looking for. The site provides links to hook you up with businesses and riders looking to sell. Click the make (Harley-Davidson, Indian, Kawasaki, or one of nine other manufacturers) and narrow it down to a year, model, and/or ZIP code and you're on your way to finding the nearest purchase opportunity. The site also includes a search feature and a dealer locator.

Magnificent Seven
Go Straight To Video



Sigma Designs' EM8470 A/V Streaming Processor will most likely be the brain inside the e-BOX.

MPEG-4 video, that is. Seven major companies—CMC Magnetics, iVAST, Modern VideoFilm, National Semiconductor, Pioneer, Sharp, Sigma Designs—recently pooled resources to create a new company, e-BOX, dedicated to bringing MPEG-4 video to set-top boxes.

With headquarters in Japan, e-BOX participants intend to deliver a set-top box with features resembling those you get from a standard DVD player but with added capabilities. "Consumers will be able to receive . . . video-on-demand with the look and feel of a DVD movie, interactive TV broadcasts [that allow] the viewer to access additional information related to the program being watched, such as sport statistics, and an advanced PVR system [that allows] the viewer to simultaneously record two programs," says Ken Lowe, vice president of business development for Sigma Designs.

Although e-BOX is more a joint agreement to develop a product than a company per se (it has no employees), it does have a board of directors that includes a member from each of the seven companies. We don't have a definite word about e-BOX pricing. "Our goal is to be competitive with other volume set-top box solutions," says Lowe. If the project stays on schedule, the first e-BOX will be available early next year. ▲

Online Around The World

Number of Russians with Internet access

18 million

Number of South Koreans who visited adult sites in March

10.7 million

Number of unlicensed Shanghai Internet cafes China recently shut down

200

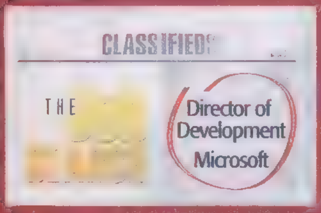
Source: NUA Internet Surveys

BIOS Upgrades Available Online

Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Check out www.smartcomputing.com/cpumag/jul02/bios to see the entire upgrade list.

Manufacturer	File (Date Available)	URL
Gigabyte	7DX_F7 version F7 (04/12/02)	www.giga-byte.com/support/support.htm
Gigabyte	8IRXP_F7 version F7a (beta) (04/19/02)	www.giga-byte.com/support/support.htm
Gigabyte	8SRX_F9A version F9a (beta) (04/22/02)	www.giga-byte.com/support/support.htm
Gigabyte	7VRXP_F6E version F6e (beta) (04/16/02)	www.giga-byte.com/support/support.htm
Soyo	K7ADA version 2BA4 (04/16/02)	www.soyousa.com/686bios.html
Soyo	KT333 Dragon Lite, K7VXBL version 2AA1 (04/24/02)	www.soyousa.com/686bios.html
Soyo	KT333 Dragon Ultra, K7VXB version 2AA1 (04/24/02)	www.soyousa.com/686bios.html
Soyo	P4IY Fire Dragon, P4IY version 2AA2 (04/26/02)	www.soyousa.com/686bios.html
Soyo	P4S Dragon Ultra, P4SX version 2BA3 (04/16/02)	www.soyousa.com/686bios.html
Soyo	K7ADA version 2BA4 (04/16/02)	www.soyousa.com/686bios.html

Compiled by Steve Smith

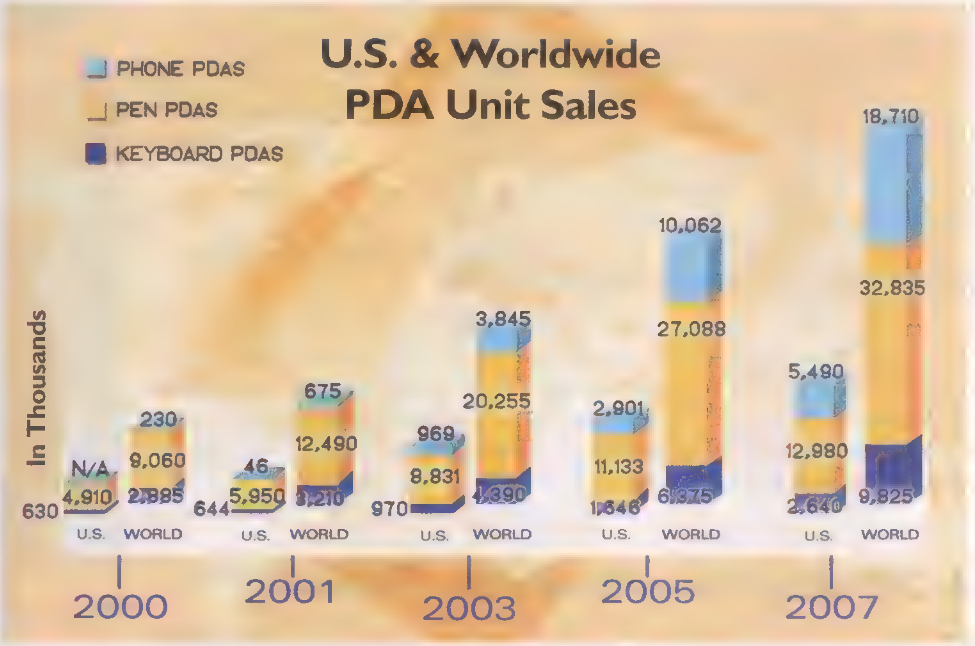


Now you can do your part to help Bill Gates take over the world, or at least our TV sets. Microsoft's unsuccessful foray into convergence, Web TV, has been retooled and rebranded as MSN TV, a part of the portal's "any device strategy." It needs a director of development to spearhead the master plan, bringing MSN, Hotmail and other Internet services into digital cable and set-top boxes of all sorts. You will assemble and manage a development team that will make the Web more TV-friendly. Although this is a managerial position, this job, posted at BrassRing.com, calls for a decade of experience in software engineering along with expertise in C/C++, XML, ASP, Web development, and server software.

Upside: You don't have to put up with the rain in Redmond. This job is in Mountain View, Calif. Downside? Kiss your life goodbye. Entire books have been written about the competitive work culture within Microsoft, where employees have been known to clock insane workweeks to nab those much-covered and legendary corporate stock options. When the company says it is looking for a "highly motivated individual," you can be sure it is understating the case. ▲

PDA Market Growth Rate Down . . . For Now

The rapid growth the PDA market had enjoyed over the last five years gave way to more sluggish sales in 2001, causing the growth rates to slow considerably. Analysts at Computer Industry Almanac (www.c-i-a.com) predict this trend will continue worldwide in 2002: Now that every computer geek already has his own handheld (or two), the rest of the world is waiting for these gadgets to become more versatile. Once 3G cellular wireless networks become prevalent after 2003, we will see demand for phone/PDA combo units skyrocket, say the researchers, injecting new life into the market growth rates. By 2007, when worldwide shipments of PDAs should rise to more than 61 million units, the common handhelds will be a multifunction wunderkind, sporting a digital camera, always-on Web access, a scanner, and a music player. ▲

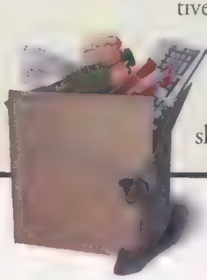


Source: Computer Industry Almanac (January 2002)

Government IT Giveth & Taketh Away

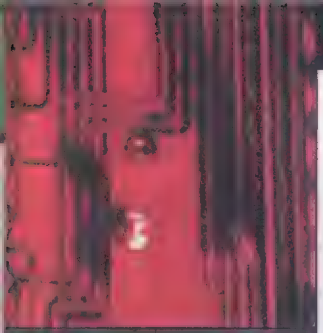
Uncle Sam can't make up his mind whether to fire or hire IT staff. As part of enhanced security during the war on terrorism, the Department of Defense is scheduled to enforce a ban on the use of foreign nationals (holders of H-1B visas) in what the DoD calls "sensitive but unclassified positions." Until now, non-U.S. citizens were restricted from handling classified information, but the new rules will extend the ban to paycheck and email processing, software development, and supply tracking.

And it's not as if the government can spare IT staff. In fact, days after the DoD announced its policy shift, the House of Representatives began discussion of the Digital Tech Corps Act, a plan to ease the critical shortage of techies that the federal government expects in the next few years. Approved by the House in April but awaiting Senate agreement, the DTC Act allows a worker-exchange program in which IT staff in the private and government sectors could take temporary assignments with one another. According to one of the bill's sponsors, Virginia Rep. Tom Davis, about half of the federal IT workforce is slated to retire by 2006. ▲



by Alex St. John

Broadcast Gaming



Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is president and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

Games are a media type just like music, television, and print. All of these media types have both retail and purely electronic distribution forms: Magazines→Internet, Music CDs→Radio, Movies→Television. Oddly, games do not. You can get toy flash games and Javascript renditions of checkers online, but REAL games come in boxes for some reason. The excuse most people accept is that there isn't enough bandwidth to broadcast games to your computer electronically, but is this really the case? A thousand years ago I might have asked the same question of print: Why isn't there a *Medieval Europe Today* newspaper? The answer then would have been that there aren't enough monks to paint all the pages and horses aren't fast enough to collect the news and distribute it widely in a timely fashion. Did we ultimately solve the problem with more monks and faster horses? No, the technology for printing and distributing text had to change fundamentally. We had to invent phones, trucks, and printing presses.

How then will games come to be distributed online? The technology for creating and distributing them must change fundamentally. Games today are built very much like books were a thousand years ago. Each game developer custom-creates their own 3D engine, which is 95% identical to every other 3D game engine, they custom-develop new tools for each game, and they rewrite the same finite state machine behavior system and customize it manually for the particular experience they want to create. Every monk . . . er, developer insists that there is something so special and compelling about their calligraphy that using a standard font would disastrously diminish the richness of the content they are creating, hence games often take years to create. As we ultimately learned with text, we will have to rediscover with games one day. The substance of the text is far more important than the font and the bookbinding. Games are ultimately about game play and little else; the state-of-the-art 3D engine and gorgeous graphics are trimming. The game industry's attachment to mixing its own inks, making its own paper, and hand binding every book is what makes broadcasting games online difficult, even in the presence of broadband.

> **Games today are built very much like books were a thousand years ago.**

Broadcast games will look and behave entirely different from the games we know today. To find a meaningful analogy, consider how the movie business made the transition to television. Movies are 2-hour productions that people have to go out of their way to consume; most people know what movie they plan to see before they turn up at the theatre. Television is broadcast directly into your home; a significant proportion of your viewing choices are made on impulse. On television you have 30-minute "Seinfeld" episodes, 30-second Coke ads, 10,000 hour epic "Star Trek" sagas broken into 1-hour segments, real-time news, and weather. The businesses are also very different. At the movies everybody pays the same amount of money to see a fixed package of content, just like buying a game in a box. On television you get premium channels, pay-per-view, subscription content, and advertiser-sponsored content. Broadcast games will share many of the same characteristics: You'll get them in episodes, you may pay a subscription, some of the content will be advertiser-sponsored, there will be premium content you pay extra for, and all of this will be broadcast to your computer online. Television content is produced on lower budgets and in shorter production cycles than movies, but that does not mean that the content is any less entertaining, just different. Nobody would go to see the David Letterman show as a movie, but millions of people spend more time watching Letterman every year than they spend in a theatre.

Broadcast games will also come to be integrated with other media types. A TV show like "Witchblade" will have new episodes of the Witchblade game every week tied to each episode of the show. New movies like "Men In Black II" will be launched online with video games first. Major sporting events like Fox Baseball will have online fantasy baseball games tied to live telemetry from the real games. Advertisers like Nike may create their own free extreme sports games online. Think I'm talking about science fiction? Take a look at www.nikesoccer.com or http://foxsports.lycos.com/games. Broadcast games are here. ■

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EXTREME HARDWARE

These Gizmos Don't Sing It, They Bring It

Poet/lyricist Vince Neil of the musical combo Motley Crue once humorously advised, "Girl, don't go away mad; just go away!" Oh, the cad. However, there are times when being repellent is attractive, as in those tedious shark encounters. This month's Extreme Hardware roster can help you shoo away those Paleozoic predators, your keyboard, and even burglars with help from a robotic dinosaur. Go ahead; repulse things. We do.

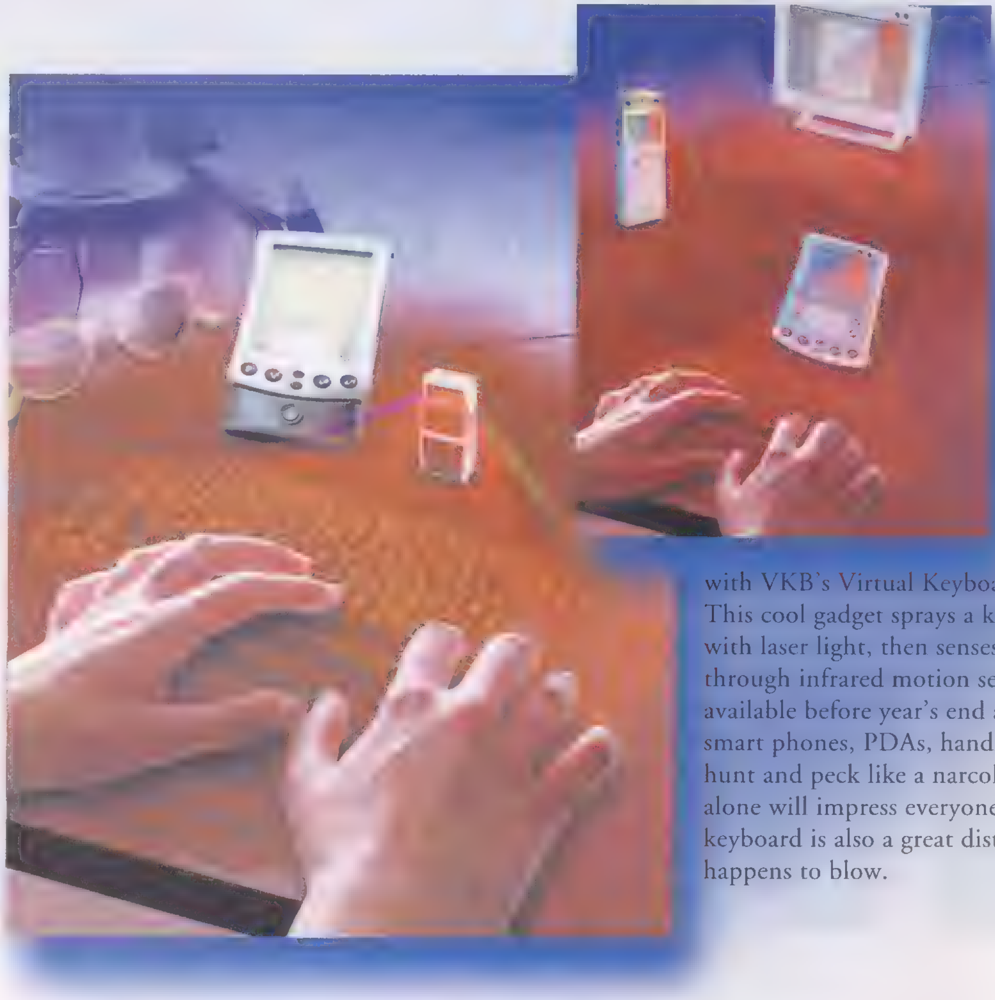
by Marty Sems

Omron/Tmsuk M2M Robot System

Sony's AIBO isn't meant to be a dog, which becomes painfully clear when someone breaks in and steals yours without even getting bitten. Omron (www.omron.co.jp) and Tmsuk (www.tmsuk.co.jp) have collaborated to fill the electronic watchdog gap with digital dinosaurs. If Johnny Badguy attempts to B&E your casa while you're away, sensors mounted on your doors and windows tip off your M2M Center. M2M calls your NTT DoCoMo Forma 3G phone (What? You don't have one? We neither) then wakes your stegosaurus. You can control your Beast Wars baddy right over the phone, directing it to lumber around the house with its video camera so you and the police know what's going down. Japanese consumers might buy these in a year or so for about the price of a small car. What happens when the burglar sees it? If only the dino had lasers attached to its head . . .

SeaChange Technology Shark Shield

Ah, Australia. The continent where the women all resemble Nicole Kidman and the men spend their days tearing up the highways trying to steal Mel Gibson's petrol. (Who says we Yanks are ignorant?) And apparently, you can't swing a wallaby there without hitting a few sharks in the teeth. No problem, mate. Strap on a Shark Shield from SeaChange Technology (www.seachangetechnology.com.au). The device pumps out an electromagnetic field around you as you swim, which will freak out a shark's electrically sensitive snout so he will go bite someone else. There are two Shark Shield models, both weighing approximately 2 pounds. The DIVE01, however, has a bigger field and longer rechargeable battery life (four hours) than the GPSS01 (two hours). Tentative U.S. prices fall between $430 and $480. Shark Shields work, too. We waded ankle-deep in the Platte River with one on. Number of shark attacks: zero.

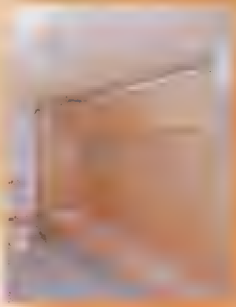


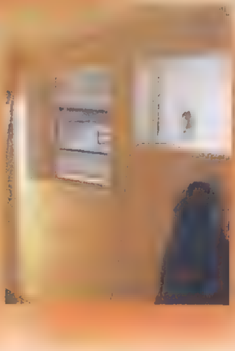
VKB Virtual Keyboard

Even folding keyboards can add a bit of bulk to your mobile gadget of choice, and "no keyboard" options often mean tapping away on tiny keys or a stylus on-screen. Forget that noise. You can have a full-sized keyboard that disappears into thin air with VKB's Virtual Keyboard (no price yet; vkb.co.il). This cool gadget sprays a keyboard on nearly any surface with laser light, then senses which "keys" you type through infrared motion sensing. The first units should be available before year's end as USB or serial accessories for smart phones, PDAs, handhelds, and PCs. Even if you hunt and peck like a narcoleptic sloth, your keyboard alone will impress everyone at the business meeting. The keyboard is also a great distraction if your presentation happens to blow.

Internet Sauna

Web videoconferencing from a sauna? Woohoo! Our beloved editor, Samit, has been watching this development for a while now. We're not quite sure what has his rock pile steaming, but we can certainly appreciate how good for business Oy Media Tampere's Internet Sauna (www.mediatampere.fi/sauna) must be. After all, the company says most business deals in Finland are done in the sauna. (Stop giggling, Samit! What's your problem?) This techy twist on a Scandinavian institution runs under Linux on a 500MHz PIII PC. On the audiovisual end are a Canon VC-C4 camera, a VCON ViGo videoconferencing appliance, a 19-inch Fujitsu monitor, and AKG microphones to transmit the steamy communications amongst towel-draped correspondents in real-time. (No, Samit, they didn't mention a 24/7 Web cam; why do you ask?) Oy Media Tampere built the Internet Sauna as a one-off, but if "Suddenly Sauna" Samit has his way, *CPU* may soon build its own.





Whole Lotta Shakin' Going On

Tune In To PC Speaker Systems

Inspire Slim 2600

$59.99
Creative Labs
(800) 998-1000
(408) 428-6600
www.creativelabs.com

When a power user builds a high-end PC for entertainment purposes, the speakers are often one of the last things taken into consideration. You'll spring for the fastest video card you can afford, and a 21-inch monitor will look gorgeous, but eye candy is only half the multimedia equation. To truly complete an entertainment PC, you need good speakers. The right speakers can enable your PC to rival your home entertainment center for high-quality sound.

Klipsch has been the undisputed king of 4.1 and 5.1 speaker systems, with its ProMedia series burying the competition (most PC speaker manufacturers have focused on less powerful and less expensive products). But the tide is turning. Creative Labs, Logitech, and Altec Lansing are now also making quality 4.1 and 5.1 systems for audiophiles.

To determine which speaker systems could get my toes tapping and raise the hackles on the back of my neck, I rounded up a fistful of 2.1, 4.1, and 5.1 speaker systems for a comparison.

How We Tested

Benchmarks for testing a speaker's audio quality are pretty much nonexistent, so I relied on my keen listening skills instead. To test our speakers (and rattle the walls of *CPU* headquarters) I used NASCAR Racing 2002 Season and Medal of Honor: Allied Assault. I also played several chapters of "Saving Private Ryan" on DVD and several songs on CD, including "Boom Boom" by John Lee Hooker, The Who's "The Real Me," Fatboy Slim's "Because We Can," and Grieg's haunting "Ase's Death."

2.1 Systems

Most of us would prefer a 4.1 or 5.1 system to a 2.1 system, but those systems aren't always practical, even for power users. If you live in an apartment or your PC is in a relatively small room, a 400-watt speaker system is probably overkill. In addition, 2.1 speakers tend to cost a lot less than some gaudy 4.1 and 5.1 systems. Ultimately, you don't necessarily have to sacrifice great audio by opting for a 2.1 system.

Creative Labs Inspire Slim 2600

The first 2.1 system I checked out was Creative Labs' Inspire 2.1 Slim 2600. It was also the best, with audio quality rating a little better than the Monsoon MM-702 system, which cost twice as much. In addition, the Slim 2600s sounded much better than the Labtec set, yet only cost about $20 more.

Like the Monsoon system, the Inspire 2600 system features flat-panel satellites. Each satellite only has 6 RMS (root mean square) watts but sounds much more powerful. The subwoofer has 19 RMS watts but also sounds louder than that.

After just a few laps of NASCAR Racing 2002 I was impressed with the Inspire speakers, especially the subwoofer. The low hum of the engines sounded excellent, and the satellites replayed the tire screeches and crunching metal pretty well. The speakers were right on in Medal of Honor: Allied Assault, and although the subwoofer isn't on par with those in the 4.1 and 5.1 systems I tested, it still packed a good wallop.

The subwoofer also did a beautiful job of hammering out the bass frequencies in "Saving Private Ryan," with the satellite speakers balancing out the higher frequencies well. Only in the CD audio test was I a little disappointed in the Inspire speakers, primarily due to a little hissing when I turned up the volume.

Even though the CD sound could have been cleaner, I like these speakers a lot. Overall, the system is the best 2.1 set in this roundup, and the price is right.

Labtec Pulse 420

The Pulse 420 speakers are the most affordable in this roundup, and I like their compact, interesting design (they're designed more for typical home users than gamers) and general audio quality.

The Pulse 420's satellites each have a mere 4 RMS watts of power. The subwoofer's 15 RMS watts give the system a total of 23 RMS watts, which seems pretty wimpy but isn't bad considering the speaker's price.

Because of the relatively low system power, I didn't expect the Pulse 420s to rock me like a hurricane, but the audio was pretty decent. In NASCAR Racing 2002, the satellites sounded fine, but the subwoofer wasn't terribly powerful. In Medal of Honor: Allied Alliance, the subwoofer dished up a little more bass, and the satellite speakers belied their small size with surprisingly good sound.

The Pulse 420s disappointed me most during the DVD test. The speakers aren't remotely close in size or quality to a home theater speaker system, but that's what a DVD movie like "Saving Private Ryan" begs for. The audio quality wasn't bad, but the big sound that other speakers I tested produced was missing. Audio CDs sounded pretty good with respectable audio, although the subwoofer warbled a little at higher volumes.

The Pulse 420 speakers aren't bad if you're simply looking for a decent utilitarian system, but they won't satisfy gamers or serious audio enthusiasts (although they aren't made for that crowd anyway).

Monsoon MM-702

The audio quality of the MM-702 system was about on par with the Inspire set, but the MM-702 speakers are *way* more expensive. I like the speakers' design, but I'll pay a lot for speakers based on how they sound and not how they look.

The MM-702's satellites have 7.5 RMS watts each, and the subwoofer has 20 RMS watts, for a system power total of 35 RMS watts, the highest of the 2.1 systems. However, the MM-702's subwoofer underwhelmed me in NASCAR Racing 2002, failing to crank out bass as well as the Slim 2600 system, even though the Creative subwoofer is slightly less powerful. The MM-702s did outperform the Labtec speakers in this capacity, though. In Medal of Honor: Allied Assault, the bass was again lacking, but the satellite speakers sounded pretty good.

The bass was better in "Saving Private Ryan," and the overall sound quality was pretty good. The MM-702s regressed during the CD audio test, however, with the subwoofer sounding fairly flat during most songs and a bit hollow at higher volumes.

The Monsoon system looks great, and it's not bad for PC games or DVD. However, I have a hard time justifying paying $150. By comparison, the Inspire Slim 2600 speakers are about the same size, cost less, and sound better.

4.1 Systems

A 4.1 system is the best overall choice at this time for PC users, providing the surround sound essential for a good DVD experience and in many of today's games. Conversely, the programs that support true 5.1 audio are still pretty limited. More programs, especially games, will support 5.1 audio soon, but often the center channel in a 5.1 system is as quiet as a Buddhist monk during naptime.

Altec Lansing 641

I've liked most of Altec Lansing's speakers in the past, so I was anxious to see (or hear) what the 641s had to offer. Generally, I liked the 641s, although they're a little overpriced.

I also took issue with the company promoting the system as having 400 watts of power. This is at best a truism. The system's total RMS watts is actually 200, not 400. The speaker's total *peak* power is 400 watts, but peak power only measures the power the speakers can handle in one blast, not the power they can sustain over time. Most manufacturers use an RMS rating because it's less misleading. In any case, each 641 satellite has 25 RMS watts of power, and the subwoofer has a pretty substantial 100 RMS watts.

The sound effects in NASCAR Racing 2002 were solid, especially when Dale Jarrett and I crashed into the wall in turn three at Daytona. The subwoofer wasn't quite as strong as the Logitech or Klipsch 4.1 speakers, but it's certainly adequate. In Medal of Honor: Allied Assault, the satellites and subwoofer did a great

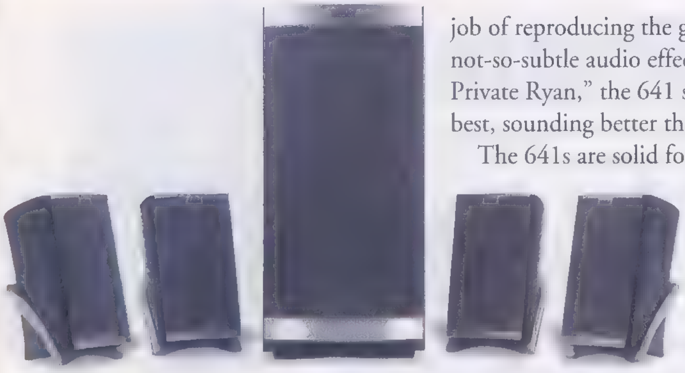
Pulse 420
$39.99
Labtec
(800) 732-3053
(702) 269-3612
www.labtec.com

CPU CPU

MM-702
$149
Monsoon
(877) 722-834
www.monsoonpower.com

CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU CPU 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect



641

$279
Altec Lansing
(866) 570-5702
(570) 296-4434
www.alteclansing.com

job of reproducing the game's subtle and not-so-subtle audio effects. In "Saving Private Ryan," the 641 speakers were at their best, sounding better than with either game.

The 641s are solid for CD audio, but the quality wasn't quite as good as during the DVD. The speakers are loud enough, however, as I definitely felt a tingle in my back with the volume turned up.

The only thing really wrong with the 641 system is the price. The speakers aren't as good as the Klipsch or Logitech sets, yet they cost more than both of those systems.

Klipsch ProMedia 4.1

I had listened to the ProMedia 4.1 speakers before this roundup and was blown away. I'm still blown away. The ProMedia 4.1s have been the top 4.1 speakers for a long time, with no other system even in their realm—until recently.

Why so great? Just check out the ProMedia 4.1's specs: 60 RMS watts for each satellite, a fat 160 RMS watts for the subwoofer, and a very generous 400 RMS watts system total. That's as much as (possibly more than) you'll find in some home theater systems.

In NASCAR Racing 2002, the ProMedia 4.1s hummed with the roar of the engines, an effect greatly enhanced by the excellent subwoofer. The subwoofer also starred in Medal of Honor: Allied Alliance, as I could feel each explosion through my chair. In addition, the satellites clearly dished out each rifle shot and each character's utterances. In short, the ProMedia 4.1s are excellent gaming speakers.

The speakers are also great for DVD. As in the games, the speakers picked up the auditory nuances of "Saving Private Ryan" beautifully. The system also hammered out the bass, and I didn't miss the center channel Klipsch includes in the ProMedia 5.1 speakers. The ProMedia 4.1s CD audio also impressed me, with the subwoofer and satellites balancing each other out well.

At $150 less, the ProMedia 4.1 system seems like a better deal for now than Klipsch's ProMedia 5.1 system, as not enough programs incorporate six channels of audio to justify the 5.1's extra expense yet.

Logitech Z-560

OK, I'll say it (and I'll stand by it): The Logitech Z-560 speakers are better than the Klipsch ProMedia 4.1 speakers. This is mostly a matter of price rather than sound, as I noticed no difference in audio quality between the systems. It is hard not to notice, however, that the Z-560s cost less than $200.

The Z-560's satellites have 53 RMS watts of power each, a hair less than the ProMedia 4.1s. The Z-560's subwoofer makes up for that with

ProMedia 4.1

$249
Klipsch
(888) 554-5665
(317) 860-8100
www.klipsch.com

Sweet Speaker Specs: We put nine speaker systems to the test to determine just how sweetly

	2.1 Systems			4.1 Systems
	Creative Labs Inspire 2.1 Slim 2600	Labtec Pulse 420	Monsoon MM-702	Altec Lansing 641
Price	$59.99	[illegible]	$149	$279
Speaker Dimensions (inches H x W x D))	2.25 x 4.125 x 6.375	5 x 3.25 x 3.25	9.25 x 4.75 x 4	8.5 x 5 x 5.4
Subwoofer Dimensions (inches H x W x D)	9.875 x 8.75 x 8.75	9.5 x 7.25 x 7.25	9.5 x 7.25 x 10.88	18 x 8.3 x 18.5
Satellite RMS Watts (each)	6w	4w	7.5w	25w
Subwoofer RMS Watts	19w	15w	20w	100w
Total RMS Watts	31w	23w	35w	200w
Signal-To-Noise Ratio	75dB	91dB	>70dB	>70dB
Frequency Response	38Hz to 20KHz	40Hz to 20KHz	50Hz to 20kHz	27Hz to 20KHz
CPU Rating	3.5	2	2	3
Manufacturer	Creative Labs	Labtec	Monsoon	Altec Lansing
Final Word	Excellent sound for a 2.1 system	Not for gamers or audiophiles	Good sound, but be ready for sticker shock	Respectable, but not on the same level as the Z-560s
URL	www.creativelabs.com	www.labtec.com	www.monsoonpower.com	www.alteclansing.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

188 RMS watts, 28 more watts than the ProMedia 4.1's subwoofer. The Z-560's 400 RMS watts of system power is more than enough to make your house pets run for the hills.

The Z-560 speakers blew me away in every test. I didn't want to stop playing NASCAR Racing 2002 as the engines, tire screeches, and crashes sounded quite realistic. So did the explosions in Medal of Honor: Allied Assault. I especially liked the distinctive "ching" a spent cartridge made being ejected from an M1 Garand.

The speakers sounded beautiful during "Saving Private Ryan"; I particularly liked the subwoofer, which rattled my spine during the Omaha Beach invasion scene. The speakers' CD audio also rocked me, sounding very clean, even with the volume jacked up. The subwoofer's hum was exceptionally satisfying during Grieg's "Ase's Death."

The Logitech Z-560 system is my top pick in this roundup. I'd expect speakers this good to cost a lot more. At $199, the Z-560s are hardly cheap, but dollar for dollar they're the best speakers on the market.

5.1 Speaker Systems

We haven't seen many 5.1 speaker systems for the PC yet, but a few companies have dipped their toes into this market's pool. These systems should be all the rage as more programs begin supporting 5.1 audio. The 5.1 systems I tested sounded great, but I'll wait to buy a set when they're more practical. Still, it was fun to play with them.

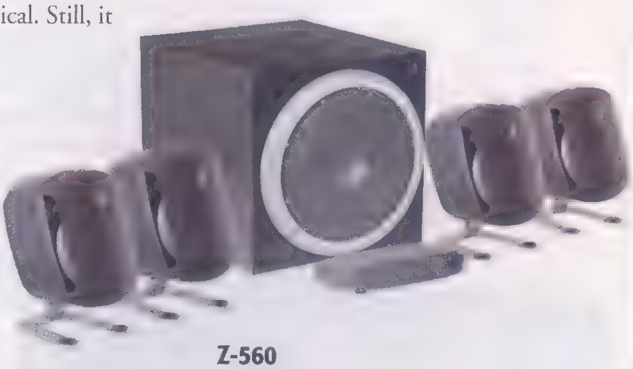
Altec Lansing 251

Altec Lansing tries to give PC users the best of both worlds with its 251 speakers by providing a high quality, six-channel speaker system at less than $100. That's a lot to ask, but the 251 speakers do a pretty good job.

The system's specs can't match the Klipsch or Creative Labs 5.1 systems, with the satellites at only 9 RMS watts each and the subwoofer only 45 RMS watts. That's pretty light for a 5.1 system, but those sacrifices keep the system's price below $100.

During NASCAR Racing 2002, the satellites sounded fine, and the subwoofer wasn't bad, although it couldn't pound out the bass frequencies nearly as well as the other 5.1 systems. The subwoofer packed a little more punch in Medal of Honor: Allied Alliance, and the satellite speakers played the higher frequencies well.

I was impressed with the 251's DVD performance. The subwoofer sounded even better during "Saving Private Ryan," and the satellites were crystal clear. CD audio didn't go as



Z-560
$199
Logitech
(800) 231-7717
(510) 795-8500
www.logitech.com

251
$99.95
Altec Lansing
(866) 570-5702
(570) 296-4434
www.alteclansing.com

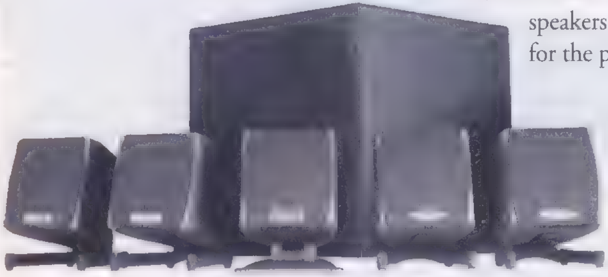
each could serenade us. Included here are the specifications for the individual systems we plugged in and listened to

		Systems		
Klipsch ProMedia 4.1	Logitech Z-560	Altec Lansing 251	Creative Labs MegaWorks 510D	Klipsch ProMedia 5.1
$249	$199	$99.95	$349.99	$399
8.5 x 4.2 x 5.67	6.5 x 4.5 x 5	5.6 x 3.8 x 3.6	4.375 x 4.125 x 4.875	8.5 x 4.2 x 5.67
9.25 x 10.25 x 13	11 x 11 x 13.5	11.2 x 7.5 x 6.9	12.875 x 11.4375 x 12	11.25 x 11.875 x 15
60w	53w	9w	70w	60w
160w	188w	45w	150w	200w
400w	400w	90w	500w	500w
100dB	>100dB	<70dB	95dB	>100dB
29Hz to 20KHz	35Hz to 20KHz	35Hz to 18KHz	32Hz to 18KHz	25Hz to 20KHz
[illegible]	4.5	3	3.5	4
Klipsch	Logitech	Altec Lansing	Creative Labs	Klipsch
Still excellent, but no longer the very best	Hail to the king, baby	Affordable 5.1 system but light on power	Cool features, but tone deaf during CD audio test	Awesome sound, but do you really need 5.1?
www.klipsch.com	www.logitech.com	www.alteclansing.com	www.creativelabs.com	www.klipsch.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

well, however. The bass was hollow during some songs, and the subwoofer just didn't pack the wallop other 5.1 subwoofers did.

If you *really* want a 5.1 system but don't have $400 to blow, you can get by with the 251 speakers. They're not my favorites, but for the price, they're not bad.



MegaWorks 510D
$349.99
Creative Labs
(800) 998-1000
(408) 428-6600
www.creativelabs.com

CPU CPU CPU C

Creative Labs MegaWorks 510D

Creative Labs' 2.1 Inspire Slim 2600 system is excellent, but the company is probably better known for its Cambridge SoundWorks line of 4.1 and 5.1 speakers. The MegaWorks 510D speakers are different than the other speakers I reviewed in that they have both a digital and analog connection, so you can set them up to output digital signals only. Although this is mostly a good thing (especially for games), it does have a minor drawback, as you'll see later.

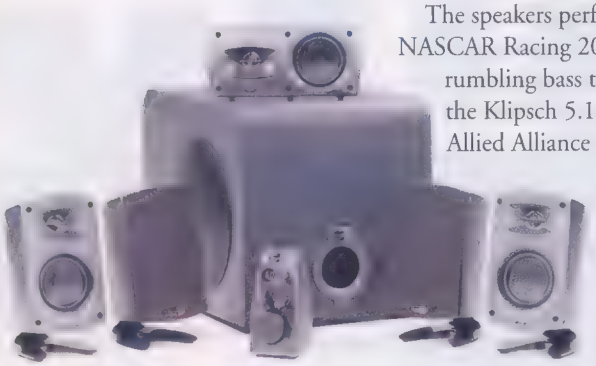
The MegaWorks 510D's satellites boast a hefty 70 RMS watts each, the best in this roundup. The subwoofer is *only* 150 RMS watts, considerably less than the Klipsch's 200-watt monster. Still, the subwoofer can shake you out of your chair if you're not careful.

The speakers performed very well in NASCAR Racing 2002, especially with a deep rumbling bass that nearly equaled that of the Klipsch 5.1 speakers. Medal of Honor: Allied Alliance actually did sound better on the MegaWorks 510Ds than the Klipsch 5.1s, with the satellites and subwoofer balancing just right and the sound clarity rating as excellent.

Although the MegaWorks 510Ds sounded nice during "Saving Private Ryan," including a satisfyingly fat bass from the subwoofer, the speakers weren't quite as impressive as the Klipsch 5.1s.

I had mixed feelings about the MegaWorks 510D's CD audio performance. Initially, I set up the speakers for digital output only and the satellite speakers didn't sound that great. There was considerable warble during some songs, even without the volume way up. The speakers sounded much better in analog mode. I could hear a little hiss in the satellites at higher volumes, but it wasn't too bad.

I give Creative Labs a lot of credit for making a system that can compete with Klipsch's 5.1 speakers. That's no small feat. However, I still like the Klipsch 5.1 speakers a little better.



ProMedia 5.1
$399
Klipsch
(888) 554-5665
(317) 860-8100
www.klipsch.com

CPU CPU CPU CPU

Klipsch ProMedia 5.1

If you've ever checked out a high-end gaming PC from Falcon Northwest, Alienware, or the like, you probably noticed that ProMedia 5.1s were the speakers of choice. The ProMedia 5.1 speakers sound awesome, and the center channel adds a nice little kick—in the right circumstances.

Like the ProMedia 4.1 system, the ProMedia 5.1's satellites are 60 RMS watts each. However, the 5.1's subwoofer is considerably more powerful than the 4.1's at 200 RMS watts, bringing the total system power to an ear-ringing 500 RMS watts.

I could feel the racing wheel vibrate in my hands during NASCAR Racing 2002, as the subwoofer pounded out the lower frequencies beautifully. In Medal of Honor: Allied Assault, the machine gun fire was satisfyingly sharp, and the game's explosions really shook thanks to the super-powerful subwoofer.

The ProMedia 5.1 speakers were at their best during DVD playback. "Saving Private Ryan" sounded fantastic, and as in the games, I could feel each rattle and hum in my spine. CD audio was very clean, and I was able to really crank up the volume. The bass line in John Lee Hooker's "Boom Boom" felt like a jackhammer. The ProMedia 5.1 is also subtle enough to make classical numbers sound as smooth as velvet.

The ProMedia 5.1 speakers are fantastic, but they're primarily an indulgence for those who can afford them. The quality is wonderful, but I'd rather pay a little less for a fantastic 4.1 system until I see more programs using 5.1 audio.

Kick Out The Jams

Choosing between the Logitech Z-560s and the Klipsch ProMedia 4.1s was difficult; both are simply fantastic. All things equal, Logitech's price gives it the nod. For 2.1 speakers, the Creative Labs Inspire Slim 2600 system is definitely tops. The sound and design were great, and the system is affordable. The Klipsch ProMedia 5.1 speaker's exceptional sound quality make it my favorite 5.1 system. ▲

by Michael Sweet

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

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First Look: Preview

Matrox Parhelia-512

Parhelia-512
Approximately $450
for Parhelia-based videoboards
Matrox
(514) 822-6000
matrox.com/mga
Preview: No Rating

Matrox is back in the 3D graphics mosh pit with its upcoming Parhelia-512 chip. It's been two long years since gamers have had reason to take notice of the sometimes quirky company from Canada. "Parhelia" is the optical illusion created when ice crystals in the air refract light, resulting in a halo effect that looks like three suns are in the sky. This is supposed to represent Matrox's three major goals for the product: quality, performance, and features. But we think it's really about TripleHead, the feature that allows three-screen "Surround Gaming," which we sampled in Quake III and Jedi Outcast during our tech briefing with Matrox in April.

Nitty Gritty

Matrox says this 0.15-micron-based (thanks to UMC) GPU will carry a whopping 80 million transistors and a 256-bit wide memory bus with up to 256MB of DDR memory cranking up to 20GBps of memory bandwidth, almost double that of existing cards. The four programmable texture stages (enabling single pass quad texturing) and five programmable pixel shader stages (capable of being linked two at a time for dual 10-stage per clock performance) on each of four pixel pipelines explains the "36-Stage Shader Array" listed on spec sheets. Pixel shaders are version 1.3 like NV25, not like ATI's current 1.4 part. The four version 2.0 vertex shader units are DirectX 9 compatible parts but only usable at DX8.1 levels to match the rest of the pipeline. Parhelia-512 supports up to AGP 8X bandwidths with fast writes and does everything in 10-bits per channel living color.

We scored both hits and misses in our guesswork about the Matrox chip in our GPU speculation article (June *CPU*, pages 64 to 66). Here are the official corrections: Parhelia-512 supports OpenGL 1.3 rather than OpenGL 2.0, and up to 256MB DDR memory is supported, not 128MB.

That same article includes a section on DM (displacement mapping), so we won't go into detail here. Suffice it to say DM utilizes a grayscale elevation map combined with a few flat polygons to create a complex terrain model. This model can be scaled on the fly (elevation scale changed to make mountains out of molehills), "Depth Adaptive" tessellated on the fly for automatic LOD adjustment (detailed geometry close up, chunky from far away), and stored/transmitted using very little space. Character modification with displacement mapping allows the use of "all-purpose" geometry with custom displacement maps for each character. Theoretically, the same body model can be displaced to create a skinny alien or a sumo wrestler.

Also notable is Matrox' edge detail "fragment" antialiasing, which performs 16x supersampling on object edge pixels only and may be the "halfway" point for saving bandwidth while still getting high-quality visual results. FSAA is also supported but at a higher performance overhead.

Matrox has been an industry leader where 2D is concerned, and Parhelia-512 fits right in. Their DualHead-HF (High Fidelity) display engine includes two integrated 400MHz 10-bit RAMDACs, 10-bit gamma correction, dual independent RGB outputs (2,048 x 1,536 max each), dual DVI outputs (1,920 x 1,200 max each), and a single dual-link DVI output (2,560 x 2,048 max). The TripleHead Desktop supports a third RGB output (3,840 x 1,024 max). Video is handled through an integrated 10-bit TV/video encoder with NTSC/PAL output and 10-bit DVD playback via DVDMax. It also has support for true multidisplay under Windows 2000/XP and hardware accelerated multiscreen OpenGL.

Performance speculation, even by Matrox, is that while existing boards will sometimes prevail in current games, anisotropic and trilinear filtering, which can run concurrently, will be virtually free on Parhelia-512, allowing for higher visual quality at still impressive frame rates. As more graphically complex DX8 games arrive, Parhelia-512 could pull well ahead of the current competition. The Parhelia-512 is scheduled to be hitting stores (hopefully) as you read this. ▲

by Joan Wood

Parhelia-512 delivers the IMAX experience of 3D gaming by rendering supported 3D games across three displays and providing three times the regular field of view.

Microsoft's Flight Simulator 2002

Id Software™'s Quake III Arena™

First Look

Pentium 4 2.53GHz

Intel's Northwood Pentium 4 2.4GHz brought the company back into competition in comparison to the Athlon XP 2100+ where performance is concerned. AMD had owned the performance crown for over a year, but this month sees Intel extend its lead with a newer, faster P4, still based upon the deep pipeline and highly scalable 0.13-micron Northwood core and 512KB of L2 cache. Enter the P4 2.4B (using a multiplier of 18) and, slightly ahead of schedule, the 2.53GHz (using a multiplier of 19) with a new twist: the FSB is upped from 100MHz to 133MHz. The P4 2.4GHz without a "B" remains the same except that its FSB runs at 100MHz instead of the faster 133MHz.

In order to facilitate the faster 133MHz (or quad-pumped 533MHz) FSB, the new Intel 850E chipset has also been introduced. The 850E MCH chip is the same one you'll find on the i850 and i845 and is coupled with Intel's ICH2 system I/O southbridge. To quote "Gladiator," "ICH4, I will see you again, but not yet." You're welcome to give current i850-based mainboards a tweak to 133MHz (some OEMs, such as Abit, Soyo, and ASUS, allow this) but rest assured that they have not been passed by Intel's strict validation process. The annoying part is that there is nothing different that warrants an upgrade, but if you want to be safe at the 133MHz frontside bus, most users will need to jump to the i850E. Speaking of validation, at press time, the i850E was not validated to run PC1066 RDRAM either, although when used in an Intel D850EMV2 mainboard, it was recognized. Therefore when using PC800 RDRAM, the RDRAM clock multiplier is reduced from 4X FSB to 3X, stunting the amount of bandwidth between the RDRAM banks and the MCH to 3.2GBps, even though the theoretical max would be 4.26GBps with PC1066 RDRAM.

A few minor gripes aside, the raw performance of the P4 2.53GHz is beefy; it sweeps the entire benchmarks suite. Particularly impressive is the approximately 10% performance delta between AMD and Intel's fastest in Jedi Knight II: Outcast. Flight sim buffs should note the Commanche 4 scores, which also favor the P4 2.53GHz significantly. Overclocking wasn't quite as seamless as with the 2.4GHz last month, but nonetheless, I easily attained a 2.8GHz level, and it was very stable. Results will vary, but should you opt for one, give it a whirl.

The benchmarks clearly show off a delta in Intel's corner, but look closer at the fine print, especially at the price. Yes, the faster FSB and MHz increase has propped up the P4, but the 2.53GHz, at $637, is frightfully expensive. For a little less than that price, you can actually get an Athlon XP 2100+, a KT266A mainboard, 256MB of DDR-SDRAM, a GF4Ti 4200, and a PC game of your choice!

So AMD still wins out when it comes to "bang for your euro" and will continue to offer great value. But if you want the fastest setup a gamer can get, then a P4 2.53GHz with an i850E paired with RDRAM is the way to go. (The upcoming VIA P4X333 DDR platform may yet hold a better-performing DDR-SDRAM alternative.) AMD is going to need to bounce back soon if it wants to end up in power users' PCs going forward because the P4 is set to reach 3GHz with ease before the year is out. Promised price cuts make the entire prospect that much more attractive. AMD's Thoroughbred and Barton cores should bridge the performance delta closer, but AMD's eighth-generation Hammer is where the company's future prospects lie. ▲

by Alex "Sharky" Ross

Pentium 4 2.53GHz

$637

Intel

(800) 628-8686

(408) 765-8080

www.intel.com

Pentium Performance For A Price

	P4 2.4BGHz	P4 2.53GHz	Athlon XP 2100+
3DMark 2001 Default	11508	11455	10618
PCMark 2002 CPU Test	5176	5487	5154
Internet CC Winstone 2002	314	329	328
Office Productivity SYSmark 2002	[illegible]	176	134
Quake III 640 x 480	287	300	264
Jedi Knight II 1,024 x 768	111	115	105
Commanche 4 Default	48	51	47
Serious Sam TSE 640x480	148	161	155
Price	$542	$637	$244

*Tested on WinXP Pro

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

3Dlabs P10 3D Chip

Image courtesy of 3Dlabs.

P10 3D Chip
To Be Announced
3Dlabs
(408) 530-4700
(800) 464-3348
www.3dlabs.com
Preview: No Rating

CPU First Look: Preview

Back in the day, Creative Labs, along with Diamond Multimedia, were the two OEM graphics powerhouses, but times have changed. Diamond is no longer with us, and Creative Labs opted out of the U.S. graphics market some time ago. Another chapter is set to begin, thanks to Creative's acquisition of 3Dlabs. A promised 76 million transistor multithreaded VPU (Visual Processing Unit) 3D chip codenamed P10 based upon a 0.15-micron process and the highly programmable Visual Processing Architecture has recently been announced—on paper.

This new, fully DX8 pixel and vertex shader-compliant part will introduce a 256-bit DDR memory bus capable of supporting as much as 256MB of memory. Also of interest is a claimed 20GBps memory bandwidth (memory should be clocked at roughly 300MHz), which is roughly double that of the GeForce4 Ti 4600. 3Dlabs' innovations include VMS (Virtual Memory System) technology. VMS stores textures in main memory, treating the memory on the graphics card itself as a very large cache, kind of like in the CPU world. When a texture is called, a 256 x 256 block of 32-bit pixels can be addressed locally and accessed instead of the entire texture. A 16GB virtual address space will help tackle bandwidth, and this technique will come in handy in games where small parts of a texture are visible on the screen. GameCube and PS2 developers have been using this technique for a while now.

Sporting four pixel-rendering pipelines, the P10 can process two textures per pipeline. The vertex shader consists of 16 scalar independent single-precision floating-point geometry pipelines that are highly programmable, and, according to 3Dlabs, should be fully DX9 vertex shader 2.0 compliant when that time comes. Antialiasing methods will include supersampling and multisampling. Support for 10-bit per component mode high color depth will be included. Does the graphics industry need another dark horse when it comes to challenging NVIDIA's position at the top? Creative Labs, in cahoots with 3Dlabs, might be a good outside bet. After the workstation market gets its dose of the P10, Creative Labs is apparently readying a consumer product, which should come out before year's end. ▲

by Alex "Sharky" Ross

Pioneer DVR-A04

DVR-A04
$499
Pioneer Electronics
(800) 421-1606
(310) 952-2000
www.pioneerelectronics.com
CPU CPU CPU CPU

If you're strapped for space in your PC case, you may appreciate a drive that can nearly do it all. Pioneer's next-gen DVD-RW/CD-RW combo drive is the DVR-A04 (also sold as the DVR-104). This drive covers the majority of optical formats you'll likely use, from 4.7GB DVDs to 700MB audio CDs. Although combo drives almost never set land speed records in performance, this Pioneer holds up well compared to less versatile drives.

We tested the DVR-A04 on a WinXP Pro system with a 1GHz PIII, 384MB of SDRAM, and DVD Tach 98 2.52. The drive screamed to a maximum read rate of 7,107KBps (5.3X DVD), with an average 6,091KBps read rate and a 4.1X weighted DVD rating. The drive burned an entire 4.7GB mixed data folder to DVD-R in 28:10 (minutes:seconds) and to DVD-RW in 57:21. The DVR-A04 isn't a swift CD burner, taking 10:31 to burn 700MB to CD-R, but its overall utility transcends its pokiness.

Pioneer bundles several utilities, such as Veritas RecordNow DX for DVD or CD burning, Veritas DLA for packet writing, CyberLink PowerDVD XP, and Sonic MyDVD for DVD-Video authoring. OS compatibility varies for each app.

The DVR-A04 doesn't support Mt. Rainier CD-RW, DVD-RAM, DVD+RW, or Authoring DVD-R media writing. But it handles CD-Text and CD-Video, not to mention all your CD-ROMs and DVD movies. The drive also features buffer underrun protection for both DVD and CD writing. The DVR-A04 has a 1-year warranty. ▲

by Marty Sems

Maxtor Personal Storage 3000LE 120GB

Plug 'em and stack 'em. It's not just a family motto; it's the creed of the external drive junkie. People with too many digital video-editing projects in progress or who just can't say no to one more music file or JPEG have a friend in external hard drives. Both USB 2.0 and IEEE 1394 (aka FireWire) let users attach multiple drives to a single port, and both are fast enough for moderate personal data transfer speeds.

Despite its theoretical 60MBps maximum data transfer rate, USB 2.0 still reduces a hard drive's performance a bit through overhead such as EIDE to USB translation. This affects hot 7,200rpm models, as well as value drives. The DiamondMax D540X 120GB inside this 3000LE is a 5,400rpm drive, so I recommend it to people needing convenient storage space more than speed.

Our test PC now has Windows XP Pro, along with a 1GHz Pentium III, 384MB of SDRAM, and an Adaptec AVA-3100LP USB 2.0 adapter. This 3000LE doesn't come with an adapter card, but it does come with a USB 2.0 cable. Maxtor sells a USB 2.0 PCI adapter card for $49.95, which has four external ports and one internal port.

As expected, the 3000LE takes a sock to the old read/write buttons compared to the internal version. It read data at 16.2MBps on average (16.9MBps maximum) and wrote it at 11.3MBps on average (15.1MBps maximum), with a 20.8ms random access time. It also charted a 4,270KBps Winbench99 Business Disk score and a 14,600KBps High-End Disk rating. The 3000LE is great for backups and even fine for playing video, but I wouldn't choose it for heavy video editing or any apps I need to fly. ▲

by Marty Sems

Personal Storage 3000LE 120GB

$299.95
Maxtor
(800) 262-9867
(408) 432-1700
www.maxtor.com

JMTek USBDrive 1GB

Here's a USB 1.1 flash memory device with truly monstrous storage space: a full 1GB. It's physically bigger than the 256MB and smaller USBDrives at about 3.5 inches long and 0.5 inches thick. You will run the risk of co-workers asking, "Is that a gig in your pocket?"

This USBDrive also has a more streamlined cap than its wee siblings that is neither too loose nor too hard to remove. The cap's raised bumps and the USBDrive's side ridges make the unit fairly fumble-free. The unit has a sliding write-protect switch and comes with a neck lanyard and a USB extension cable. It runs under Win98SE/Me/2000/XP, Mac OS 8.6 and later, and Linux 2.4. JMTek says that future USBDrives may even be bootable.

I enjoyed playing back the "Star Wars: Episode II" trailer MPEG that JMTek's techs copied to my USBDrive. (Our little "cleaner" Mathilda is all growed up. Sniff.) Encoded at 640 x 272 resolution, the MPEG played back at full screen with only a couple of hiccups. Later, the USBDrive took 11:43 (minutes:seconds) to save a 100MB folder full of MPEGs, JPEGs, bitmaps, and miscellaneous documents from an IBM PC 300 with a 667MHz Pentium III, 128MB of SDRAM, WinXP Home, and a 5,400rpm Maxtor 10.1GB hard drive. On a Compaq with an Athlon XP 2100+, 512MB of DDR, WinXP Home, and a 7,200rpm Seagate 80GB, the same transfer took 12:00 even.

I like this USBDrive, but why pay $899.95 for 1GB when you can buy a 5GB SmartDisk FireFly USB 2.0 hard drive for $199.95? Surprisingly, both products are equally resilient, with nonoperating 2ms shock tolerances of 1,000Gs. The faster FireFly's sole disadvantage is that it's three times wider. The USBDrive's sole advantage is its lack of moving parts. ▲

by Marty Sems

USBDrive 1GB

$899.95
JMTek
(253) 952-7000
www.usbdrive.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

MicroSolutions Backpack Triple Play USB 2.0 CD-Rewriter

Model 195200

Backpack Triple Play USB 2.0 CD-Rewriter
$229
MicroSolutions
(800) 890-7227
(815) 756-3411
www.micro-solutions.com
CPU CPU CPU C

MicroSolutions' Triple Play peripherals give you freedom of choice. This 32X/10X/40X CD-Rewriter, for example, lets you choose a USB 2.0, PC Card, or parallel port connection to suit your needs.

You can also hot plug this CD-RW to a running PC through its interfaces, including the parallel port, which I did on a WinXP Home PC. This port has a passthrough port next to it, so you can connect the Triple Play between your PC and parallel port printer. Unfortunately, the drive's rear USB port is nonstandard, so it requires a special cable (included). Also included is a PC Card-to-parallel adapter cable. The drive has buffer underrun protection, a front headphone jack and volume control, and a separate 1/8-inch CD Audio Out jack in the rear.

We tested the drive with the USB 2.0 cable, as this is the only interface to support the drive's top speeds. Tested on a 1GHz Pentium III system with 384MB of SDRAM, an Adaptec USB 2.0 card, and WinXP Pro, the drive burned a 700MB folder to CD-R in 5:49 (minutes:seconds), a 427MB folder to CD-R in 3:43, and 427MB to CD-RW in 5:36. These are OK times for an external CD-RW. A slightly slow fifth pass in CD Tach 98 left the Triple Play with a 4,238KBps average read speed, with a weighted average rating of 25.0X and an average maximum read of 5,375KBps (35.8X).

Besides Win98/Me/2000/XP, this drive supports Win95/NT4 and even DOS with certain apps, but not through USB. If you deal with several non-networked computers of varying vintages, this 4-pound drive could be your ticket. ▲

by Marty Sems

Nexland Pro100 Internet Sharing Box

Pro100 Internet Sharing Box
$209
Nexland
(888) 639-5264
(305) 358-7771
www.nexland.com
CPU CPU CPU

The "Internet Sharing Box" part of the Nexland Pro100's name may be a little confusing to consumers, as it doesn't have enough 10/100Mbps ports to replace your home or small office's gateway router. Still, this gateway appliance supplies flexible inbound security through a number of technologies, along with the ability to automatically switch network Internet access to a serial modem in case the broadband connection goes down.

The Pro100's browser-based configuration gave us no guff during setup on a 667MHz PIII, WinXP system. In addition to a NAPT (network address and port translation) firewall, one of the Pro100's prime features is the ability to let multiple VPN sessions using IPsec (Internet Protocol security) pass through it unhindered. The Pro100 also supports Dynamic DNS, giving you more options for hosting servers. Unlike many firewalls, however, it doesn't log intrusion attempts or other security events.

Nexland markets the Pro100 to remote offices and telecommuters needing a VPN connection. The company's Pro400 and Pro800 have four and eight Ethernet ports, respectively. Meanwhile, the Pro800turbo can combine two broadband connections, although individual users can't exceed the speed of one line.

Although home and small-office users might buy a multiport gateway router for less money, the Pro100's advanced features may appeal to workers outside the corporate LAN. Ironically, it looks and feels like a home device. It's only stable lying flat, and it's not terribly stackable except as the top device. Stacking a broadband modem on top of the Pro100 would block several activity and error LEDs. There's also that ugly front serial port you can't hide. Nexland put some great engineering into the Pro100, but the packaging could use some refinement. ▲

by Marty Sems

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Lexmark C750

As you might expect with its $2,999 price, the Lexmark C750 boasts quite a spec sheet. This printer's 350MHz processor with 64MB of RAM is impressive, but what really stands out is that you can increase the C750's memory to 512MB.

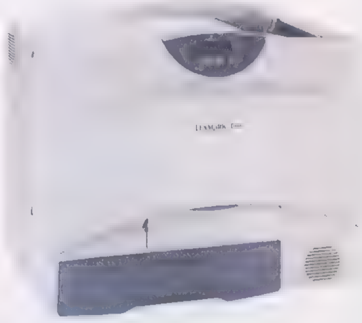
The C750 has PCL 6 emulation with 84 scalable and two bit-mapped fonts, as well as PostScript emulation with 156 scalable fonts. The printer has parallel and USB ports, and a network card is optional. The only "real" resolution setting is 1,200 x 1,200 dpi, although the printer also has a 2,400dpi setting using resolution-enhancement technology.

Print times in our lab tests were much slower than the manufacturer-rated 20ppm. A 10-page text file printed at 7.1ppm. A six-page text-and-graphics file and three-page PowerPoint file were even slower at 3.9ppm and 6.8ppm, respectively.

Text was sharp as long as it wasn't too small (5-point or less) or too large (36-point or more). These extreme font sizes looked a little fuzzy and heavy on the ink. Black and gray areas of charts had significant banding, but colored areas looked good. Clip art turned out much better than the charts, with no noticeable banding or other problems. In our PowerPoint printout, I could scrape off some of the blacks, suggesting the temperature wasn't high enough for the toner to adhere properly. Although I wasn't impressed with Word or PowerPoint charts, high-res graphics turned out well. Colors were accurate but not quite as brilliant as I expected. With no banding or cuts, though, the high-res image printouts were certainly acceptable.

This printer struggles slightly with gray images and some black text. However, its decent text, good color handling, and expandable memory make it worth considering if you need to print high-res images or memory-intensive files. ▲

by Kylee Dickey



C750
$2,999
Lexmark
(800) 539-6275
(859) 232-3000
www.lexmark.com

Olympus CAMEDIA E-20N

The Kennedy Space Center's Aerospace Imaging group took the Olympus CAMEDIA E-20N on several space missions, but despite these gravity-defying trips, the E-20N has a very down-to-earth, traditional design.

This 5-megapixel SLR digital camera features 4X optical zoom, eight white balance settings, aperture and shutter priority, several exposure settings, a hot shoe, and a threaded 9mm to 36mm (f/2.0 to f/2.4) lens. The lens is compatible with 62mm extension lenses and is equivalent to a 35mm to 140mm lens on an SLR 35mm camera.

The package includes a lens hood, remote control, and two one-time use Lithium battery packs (Ni-MH, NiCad, Lithium polymer, and alkaline batteries are optional). I'd like to see rechargeable batteries included in the $1,999 price, but they're not. You'll also likely need more than the bundled 32MB SmartMedia card. The E-20N also accepts CompactFlash I and II cards.

The E-20N is very easy to handle and not as reliant on the menu as most digicams. Most controls, including the resolution, are set using a button/mode-dial combination. You only use the Resolution menu to assign a compression setting to each resolution. The only thing that really hampers efficient, easy use of the E-20N is its slow write speed. I spent a lot of time waiting for the red LED to stop blinking so I could take the next shot.

The camera's auto mode didn't always do the best job. Low-light conditions didn't always support auto focus and sometimes produced noise or very yellow shots. Changing the manual settings corrected most image-quality problems and produced stellar images. AE-bracket mode automatically captures an image at three different exposure settings, helping to correct an overexposed outdoor image.

Olympus designed this camera with the advanced photographer in mind rather than the novice. The E-20N takes quality shots and allows maximum user control, making it a great buy for the serious photographer. ▲

by Kylee Dickey

CAMEDIA E-20N
$1,999
Olympus
(800) 347-4027
(631) 844-5000
www.olympusamerica.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Ahanix Platinum XP

Platinum XP
$80
Ahanix
(562) 259-9866
www.ahanix.com
CPU CPU CPU

Quite frankly, $200 for a good-looking case is a little decadent, isn't it? But if you still want your PC to look good, Ahanix's Platinum XP case might be worth a look. The industrial-looking ATX case sports a sleek metallic silver and gray paint job, which makes it look akin to more expensive aluminum cases.

The front bezel of the case is fully loaded. The bottom right side boasts a single FireWire port and two USB 1.1 ports, which is great news for those looking for easier access when connecting joysticks, cameras, and MP3 players. In the middle of the case, there is a distinctive digital CPU temperature display, which houses three buttons: power, reset, and ejector. Actually, the third button is labeled "Turbo" and serves a useful purpose by letting you switch the two 80mm ball bearing case fans inside on and off. When you're not pushing your PC to its knees, you can punch the "Turbo" button and do your work in tranquility. Two high-intensity LEDs (one blue and one red) keep you informed of what's going on.

Part of the hassle of trying to look good with PC cases is then having to fork out extra dough on matching accessories. It's not as though you can trot down to Vivian Westwood and try on a pair of matching silver front CD-ROM bezels, is it? The Platinum XP case ingeniously negates this need by including functional drive-bay covers that flip down when you push the eject button, letting you camouflage those beige drives. The case is roomy, allowing for as many as four internal HDs and four external 5.25-inch drives.

Tool-less assembly with thumbscrews is the norm these days, as is a pullout motherboard tray, but the latter doesn't come with this unit. If you are constantly gentrifying your PC's guts and want to avoid frustration, you might want a case that doesn't look so fancy but has a pullout tray. Nevertheless, the Platinum XP is an exceptionally good-looking bargain at roughly $80 from www.exoticpc.com or www.fancycase.com. ▲

by Alex "Sharky" Ross

Directron Silver 201T

Silver 201T
$178
Directron
(713) 773-9898
www.directron.com
CPU CPU CPU CPU

If you have multicolored PCB-based mainboards and video cards along with bright pastel, rounded EIDE cables, you will more than likely want to show them off, along with a cold cathode lighting arrangement. Am I right? As long as a $200 investment in a PC case isn't too much to ask, consider the Silver 201T from Directron. It has Plexiglas windows aplenty, one on the top and two on either side, and is available with a neon or cold-cathode light.

The case itself is based upon the company's already successful SF-201T aluminum midtower case. Once again, a rather industrial design seems to be the order of the day, with large chromed thumbscrews at the front dominating the design. The removable clear acrylic front bezel rounds things off rather uniquely in the looks department. The bottom of the front also encompasses an air-intake (filtered of course!) and an I/O interface featuring four USB 1.1 ports, as well as a single IEEE 1394 port. There are even a couple audio jacks, which you'll need to loop through from the rear of your mainboard. The entire aluminum case has a brushed finish inside and out and seems to have been polished with Turtle Wax . . .

The Silver 201T's cooling isn't quite as intense as that of the original 201T. The inclusion of windows doesn't allow for the top exhaust or side-panel exhaust fans. Instead, the case includes two rear 80mm exhaust fans (with gold-toned wire grills) and two front intake 80mm fans situated in front of the removable chrome-plated hard drive rack for good heat dissipation. Space is not at a premium with four 5.25-inch and three 3.5-inch open bays and five 3.5-inch hidden bays, all available for hard drives. Tool-less assembly and large thumbscrews made installing hardware a breeze, as did the high-quality, pullout motherboard tray.

Directron sells the premodded case for $178. It also comes in black and blue. If you want to get into case modding, this premodded case will conveniently kick open the door. ▲

by Alex "Sharky" Ross

CPU Ranking: ☐ 0 = Absolutely Worthless CPU CPU ◧ 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect by Anand Lal Shimpi

Flex Those GPUs

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, *CBS' 48 Hours and* Fortune. *His site, www.anandtech.com, receives more than 55 million page views and is read by more than 2 million readers per month.*

I absolutely refused to call any graphics processor before the GeForce3 a GPU (Graphics Processing Unit). The acronym first coined by NVIDIA was deliberately designed to be very CPU-like to give the impression that your graphics processor was much like your CPU but geared toward graphics performance in particular. The one thing that made me feel uncomfortable about using the GPU acronym was the simple fact that unlike a CPU, the GPUs of the time were not programmable. The GPUs were fed data and performed a number of simple, fixed function operations and spit out a colored pixel. With the advent of the GeForce3 with its Vertex and Pixel Shaders, I no longer felt silly calling the processor on a card a GPU. But if you thought the GeForce3 revolutionized the graphics industry with its "programmable" shaders and high performance, just wait until you see what's around the corner.

If you've paid attention to the graphics announcements that have been popping up over the past couple of months, you will notice that there is this notion of being more programmable than what today's GeForce3/4s are capable of providing. Before I get to that, let's talk about what being programmable actually *means.*

> The next generation of GPUs will, first and foremost, feature a full floating point pipeline.

Your CPU is a general-purpose processor; if you've studied computer science or engineering, you'll recognize it as a Universal Turing machine that is capable of emulating any other Turing machine, given enough resources. If you want to make your CPU add two numbers together, you can; if you want to make your CPU run a program that browses the Internet, you can do that as well. Given enough resources, you can program your CPU to do virtually anything. The same cannot currently be said about GPUs. The best example would be 3D rendering. If you go to render a scene in 3D Studio MAX, what percentage of your GPU is being used? If you answered "close to 0%," then you'd be right; in fact, your CPU is what is doing all of the work when rendering 3D scenes. But it doesn't make much sense that your CPU should be the one doing all of the work when rendering images and animations; today's GPUs are much better suited for this sort of work, but unfortunately they aren't programmable to the point where you can instruct them on how to perform this type of rendering. This will all change going forward.

When the GeForce3 launched with its fully programmable pixel and vertex shaders, it was leaps and bounds ahead of anything else we had ever seen at the time, and thus the term "programmable" was used freely. Today it's clear that the DirectX 8 class of pixel and vertex shaders were merely a trial run for the next generation of execution units in a GPU—a truly programmable set of shader processors.

The next generation of GPUs (beyond today's 3DLabs P10 VPU and Matrox Parhelia-512) will, first and foremost, feature a full floating point pipeline. Currently only the vertex shader and setup engines can work with 32-bit floating point values; once you're in the pixel pipelines you are dealing with 32-bit integers, which result in a huge loss of precision. A fully floating-point-capable pipeline, from vertices to pixels to the frame buffer, requires a considerable investment in terms of sheer gates and transistors; thus, it will only be made possible on 0.13-micron and smaller processes for most manufacturers. But it's a capability that developers have been demanding for a long time.

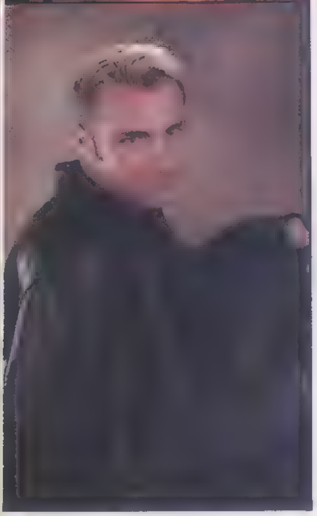
Pixel shaders will also go from being basic register combiners to fully programmable execution units that can execute code from a high-level programming language. The idea of having a C++ or Java-like language but for a GPU is something that will become a reality around the release of Microsoft's DirectX 9 later this year. This will not only make programming GPUs even easier for developers, but it will also increase what can be done with these programmable GPUs in the first place.

While all of these technologies are coming into play and hardware is being made more flexible, performance will be increasing by a tremendous amount. It took several years to get the performance of 3D hardware up to par with the demands of the games, but now it's time for the developers to begin harnessing this power. ■

You can talk back to Anand at Anand@cpumag.com.

by Alex "Sharky" Ross

VIA & P4 Go Bump In The Night



Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently swims in Silicon Valley.

Nov. 20, 2000, saw a rather lukewarm reception for Intel's Pentium 4 launch. It was no Spider-Man and much closer to Jar Jar Binks. Expensive, it required RDRAM, had too few platforms, and crucially lagged behind AMD's cheaper alternative, the Athlon, in performance. This underwhelming performance and sky-high pricing didn't endear the P4 to enthusiasts. But since the P4's introduction, Intel has dispensed with the Willamette core, upped the L2 cache with the Northwood core, shrunk the die size down to 0.13-micron, increased the frontside bus to 533MHz (133MHz quad-pumped), brought in DDR-SDRAM support, and managed to ramp up the clock speed from 1.5GHz all the way to 2.53GHz. It's taken roughly 18 months, but finally the P4 has matured into a top performer, beating everything the Athlon XP can currently muster. (See this month's review on page 25.)

It's taken roughly 18 months, but finally the P4 has matured into a top performer, beating everything the Athlon XP can currently muster.

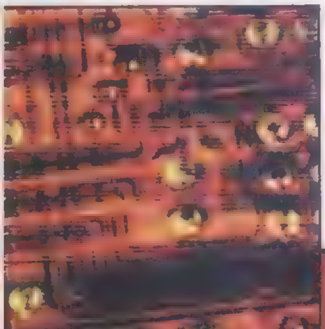
For the past 18 months, my gaming systems have invariably featured an AMD Athlon configuration of some sort, but not as of this month. In order to get peak performance with Jedi Knight II and Medal of Honor (both Quake III engine-based games, incidentally), I am now playing with a P4 2.53GHz coupled with an Intel 850E-based mainboard and 1GB of RDRAM (not exactly flavor of the month, I know). Again, I must stress that I am doing so not because it's cheap (it ain't even remotely) but because, as of today, it's the fastest setup I can lay my hands on. Going fast has never been cheap, even if it is cheerful. However, I don't think that the current Intel 850E platform (still using the ICH2) is going to remain top dog for long in the chipset arena. I am already playing with a couple of other setups that, thanks to 533MHz bus support, can accept a 533MHz FSB P4 2.53GHz. They will soon be added to the plethora of platform options for the P4, joining Intel's 850E and 845, SiS 645DX and the will it/won't it VIA P4X266A. These two new chipsets are VIA's new P4X333 and Intel's 845G.

VIA's offering is particularly interesting because it's the first P4 chipset to bring support for AGP 8X as well as DDR333MHz SDRAM to the table. Granted, AGP8X video cards are persona non grata just now, but providing you find the rather rare DDR333MHz CAS 2.0 (2.5 latency is significantly slower) SDRAM to go with it, the P4X333 looks dressed to kill. The new VT8235 southbridge introduces ATA-133 (even if Maxtor has the only hard drives available) for the first time, plus support for USB 2.0, which is really picking up a head of steam. Even if that UltraATA-133 IDE interface is occupied with an ATA-100 drive, in the future you'll have a spot for an upgrade, so no complaints there.

VIA also claims a tremendous leap in its VLINK bus bandwidth between the north and southbridge at 533MBps. Groovy so far. It gets better too, because early testing has the P4X333 stealthily approaching Intel 850E levels and indeed beating the 850E in games like Comanche 4 and Serious Sam: TSE. However, it's all fun and games unless you don't technically have a P4 bus license like SiS or indeed Intel does. Last go around, motherboard OEMs were not particularly game when it came to adoption. But for those that did try their hand with P4X266A products, no redesign will be necessary, thanks to the pin-compatibility nature of the P4X333. The real challenge lies either in the court rooms, where VIA will have to legally obtain a P4 bus license, or getting OEMs to actually release P4X based chipsets. VIA may even resort to selling its reference design through its own platform solutions group.

Rumors are that Intel is planning to slash P4 prices soon, so with this many choices, gamers and enthusiasts may well jump ship. Is that the FedEx man at the door? Oh look it's a Thoroughbred Athlon XP 2200+. . . . ■

Drop me a line at sharky@cpumag.com and bring a Barton and Hammer with you.



by Kyle Bennett

With Power Comes Responsibility

Kyle Bennett is editor-in-chief of HardOCP.com (hardocp.com), one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

Many of us have invested thousands of dollars in our computer systems. You have this great investment perched before you at home in your "computer room" or wherever you may have it stowed. I am sure *CPU* readers have a bit higher-powered boxes than most, or at least they aspire to have that killer rig. Still, what do you do with it? What are you going to do with your fancy high-dollar computer? I want to know.

Leaving your work computer out of this discussion, there are a few activities that you will most likely be conquering. Surely you will be Web browsing, and behind that, you will be trading some email. Do you play around with digital photography or home movies? Then you might be doing some editing in Photoshop or your fave editing software. That can be demanding on your box and certainly need some big MHz behind it. What else? Anyone? Anyone? Bueller? Bueller?

How could we leave out those wonderful games? I almost forgot about them. Most of us know that our closet gaming habits have become the reason for our upgrading habits. Are you tearing through Jedi Knight 2, Castle Wolfenstein, or Medal of Honor? If you are, it is most likely that you have some tremendous computational power behind you. Don't underestimate that CPU tucked inside your case.

> **You have the ability to possibly save another human being's life.**

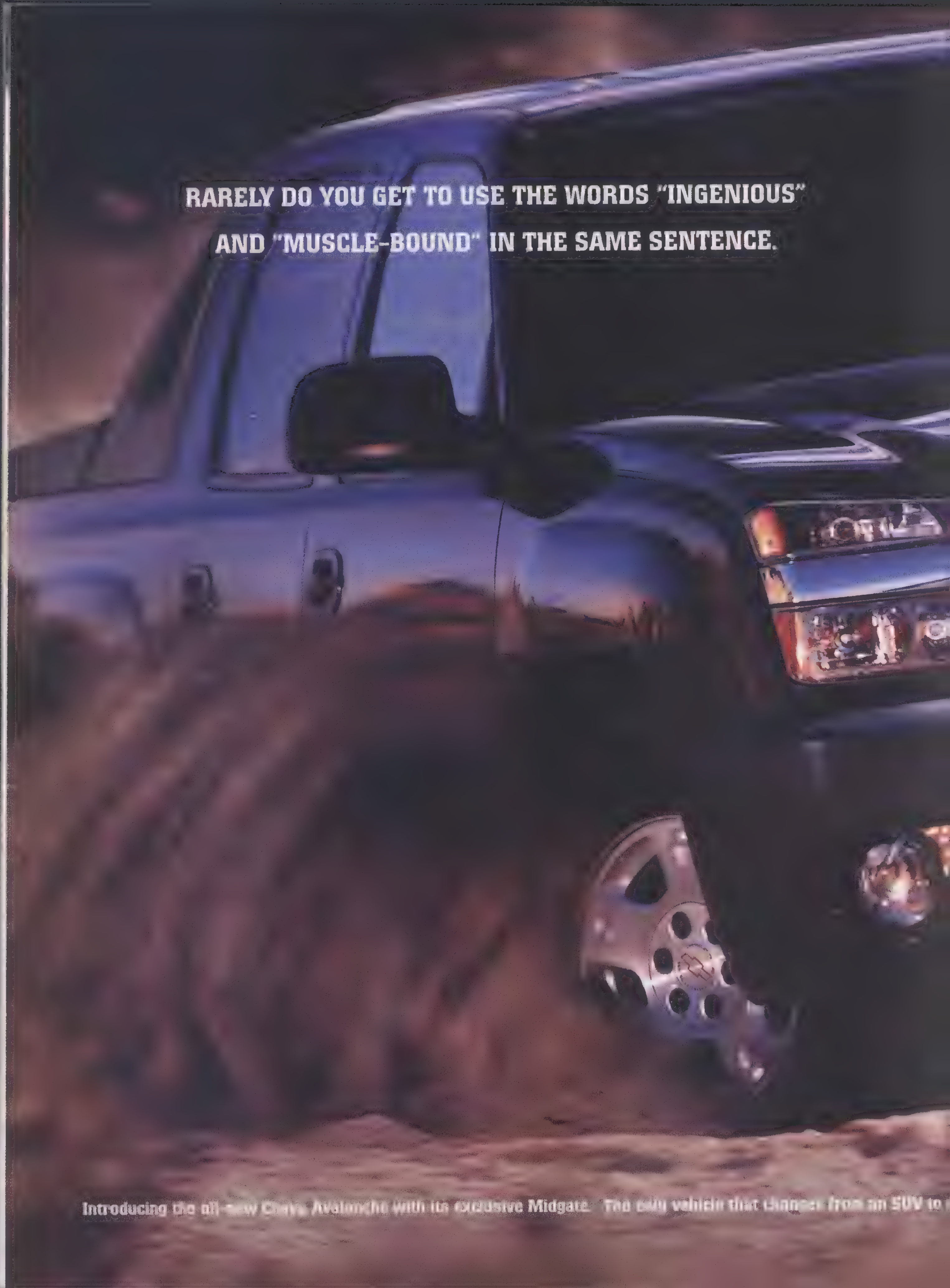
You have the power to do great things with your computer after you are done shooting bad guys, surfing pr0n, and flaming n00bs on your favorite forums. You have the ability to possibly save another human being's life. Yes, you read that sentence correctly. No, your CPU is not going to be assisting in open heart surgery, but you can use that spare processing power that more often than not lies dormant. There are only so many hours a day that you can use your home computer, and if it ever sits turned off or not utilized, you sir, have the CPU power needed to help save a life.

Outside the argument about the minimal cost of electricity for the unit (and your monitor does not even need to be turned on for this), there are very few downsides to this. What I am talking about is DC, or distributed computing. You may be aware of DC in several forms, probably the most popular being the SETI@home project that hunts the radio waves in space looking for little green men. What a DC project does is take information, like the radio waves collected from space, and package them in work units. Instead of someone paying millions of dollars for a supercomputer, they send you the work unit, or WU, via the 'Net and you have your home computer do the work when your CPU is not doing anything else. You can see how this could add up quickly if you had a couple thousand people doing this. What about a couple million? The possibilities are staggering when you can consider the terahertz of CPU power that you could reap from the collective.

While SETI was one of the DC leaders, its goal seems to pull up a bit short compared to some of the other worthwhile DC projects that are going on today. There are now four or five worthwhile projects going on that are affiliated with respected universities doing medical research. My personal favorite is the Folding@Home 2.0 project. Its DC program allows you to use your PC to help study protein folding, misfolding, aggregation, and the diseases related to these things, namely cancer, Parkinson's, and Alzheimer's, but many others as well.

As of writing this, the members of our team hold the #1 rank in the world for producing the most work units. While we would love to have you on our team, I think it is more important to stress to you that you can be doing something very good for your fellow man or possibly even yourself one day with your PC right now. Our Web site at http://hardfolding.com will give you gateways to these humanitarian causes, and yes, possibly allow you to save a life with your PC. Now, put this magazine down and go help the world be a better place. ■

Talk with Kyle at kyle@cpumag.com.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USA

Each month we ask a staff writer to take on our publication editor in a challenge to build the best PC for a certain price. Because our writers don't want to lose their jobs, they always accept this challenge willingly. Tempers will flare. Tools will fly. But only one will prevail.

This month the challenge is to build the
Smallest Footprint System For Less Than $1,500.

Samit Choudhuri
Publication Editor
Computer Power User

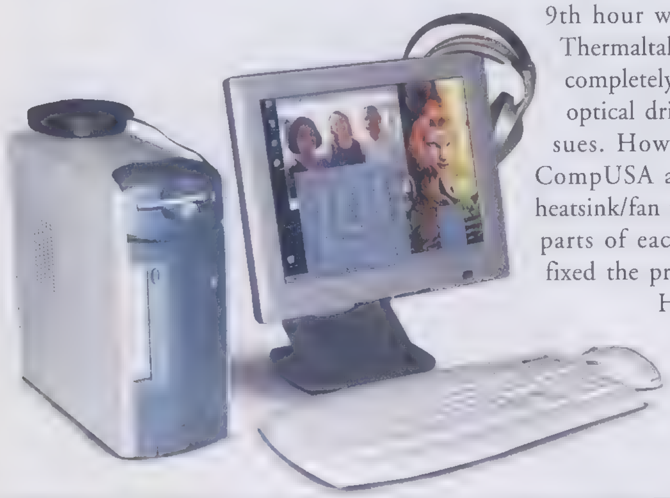
Samit

Do you play the "in bed" game with fortune cookie prophecies? You know, the one where you read the fortune cookie and add the words "in bed"? I tend to do something similar with most PC Challenges, but I add "for computer power users." For example, this month I built "the smallest footprint system for less than $1,500 for computer power users." The irony of the situation is that I had the Shuttle SS50 in my Directron.com shopping basket but at the last minute opted to cancel. I just couldn't live without an AGP slot at this budget and the SS50 was just "too easy." But I guess it wasn't too easy for Cal "Anakin Whiner" Clinchard.

The SS50's packaging was almost perfect: But it had no AGP slot and the built-in chip's 3D performance was pretty naff. Instead I went for the Abit NV7m Micro-ATX mobo with an Athlon XP 1800+ and 512MB of fast DDR, which gave me the power to pop in a faster video card if needed. I played a substantial chunk of Dungeon Siege on this machine without any incident and was pretty pleased overall. The In Win case I finally selected was attractive and about the same width of the Shuttle; it was actually my fourth choice. Here are two other systems I considered in addition to the Shuttle SS50: GSM-Barebones AL-801 (bunteseiten.com/bare1.htm) and Pocket Mini-PC GX1 (www.bixnet.com/amdk7com.html).

I briefly considered building an ITX-based system but was having trouble finding an ITX mobo for sale. That's probably all for the best. The Toshiba DVD/CD-RW combo drive will let you write your CDs and DVD-to-VCD backups with ease; I considered a 40X Sexy Plexy but opted for the convenience of DVD playback. The included ATI TV Wonder VE PCI card with its excellent GUIDE Plus+ Interactive Program Guide and wireless rechargeable headphones/keyboard/mouse will let you use this system in a room other than your office (even the loo!). And the swiveling Philips LCD screen will display a full page of a recipe as you cook. Besides, this system's wireless technology doesn't even require the system to be anywhere visible. And the bonus? Drop in a nice video card, and you'll have a decent FPS LAN party system to boot.

The major difficulty I ran into at the 9th hour was discovering how the Thermaltake heat sink and fan were completely blocked by the Toshiba optical drive, which led to heat issues. However, running down to CompUSA and picking up another heatsink/fan unit and then combining parts of each for the final product fixed the problem: the Frankenstein Heatsink/Fan. See? Insidiousness has its benefits. I never leave home without it.



Component	Model	Price
Case	Barebones System (including Power Supply) In Win L545P with 180w/ Micro-ATX power supply[2]	$45.99
Motherboard	Abit NV7M Socket A Micro-ATX (nForce) with integrated audio, video, and Ethernet[2]	$474.99
Processor	AMD Athlon XP 1800+ with Thermaltake Volcano 6Cu+ CPU Cooler[2]	N/A
Memory	256MB 266MHz DDR x 2 with Thermaltake Memory Cooling Kit[2]	N/A
Hard Drive	Maxtor ATA/133 7,200rpm 60GB[5]	$95.99 (with coupon)
Video Card	Integrated with Abit VN7M mobo	N/A
Sound Card	Integrated with Abit VN7M mobo	N/A
Network Card	Integrated with Abit VN7M mobo	N/A
Modem	Don't need no steenkin' modem	N/A
DVD-ROM	Toshiba SD-R1202 CD-RW/ DVD-ROM Combo (1)	$98
Diskette	Panasonic 3.5-inch Diskette Drive[1]	$8
Monitor	Philips 150 B2E 15-inch Swiveling LCD[4]	$479.99
Headphones	Advent AW770 900MHz Wireless Headphones[4]	$99.99
Mouse & Keyboard	Microsoft Wireless Keyboard and Wireless Wheel Mouse Combo (OEM)[1]	$48
Software	Microsoft Windows XP Home Edition[1]	$88
Miscellaneous	CompUSA CPU Fan[3]	$19.99
	ATI TV Wonder VE[4]	$49.99
Subtotal		$1,508.93
Shipping		$33.74
Tax		$47.19
Rebates		$110
TOTAL		$1,479.86

Purchased From:
1 NewEgg.com
2 Directron.com
3 CompUSA
4 Best Buy
5 Office Depot

LLENGE

S.

Cal Clinchard
Staff Writer
Computer Power User

Cal

Did I hear correctly? Apparently my opponent, Darth Choudhuri, as my worthy colleague Marty "Obi Wan" Sems calls him, ordered a bunch of parts and sent them all back! Could it be that the Insidious One is RUNNING SCARED?

When I started working on this challenge, I considered doing some whacked-out things with a hibachi or building a miniskyscraper of a system—something that would loom large but sport a technically small footprint. However, although I was allocated a decent amount of cash for this endeavor, I had little time to get the job done and even less in the way of case-mod tools. So I aimed for practicality in a small box, keeping in mind quick portability, easy Internet and network connectivity, and, if possible, power.

I started with Shuttle's SV24 Barebones System, which includes VIA's VT8363A chipset, integrated Savage4 2D/3D video, and integrated sound. This little box isn't intended for overclocking or maximum 3D gaming, but with one PCI slot, two IDE ports, one 5.25-inch bay, and two 3.5-inch bays, it leaves just enough room to squeeze in some kick-butt components. Plus, the aluminum case is well ventilated and includes two fans for decent cooling. The system comes with ports galore: serial, parallel, VGA, S-Video, composite video, USB x2, IEEE 1394 x2, RJ45, PS/2, and audio in/out.

I wanted a cool, fast processor, so I opted for VIA's 900MHz C3. I chose a pair of 128MB SDRAM modules; this leaves room for an upgrade up to 512MB. I also wanted a fast, large-capacity hard drive, so I purchased Seagate's 80GB Barracuda, which spins at 7,200rpm.

Keeping burn fanatics in mind, I bought Samsung's awesome 24X10X40X CD-RW; I considered the DVD/CD-RW combo route, but that would sacrifice a great deal of CD-RW vim. I also bought a zippy sound card but realized the system should have a modem, so I bought one to fill the PCI slot.

The piece de resistance is Envision's EN-5100e. I chose Logitech's Cordless Freedom Optical keyboard/mouse combo, a nice RF get-up that's easy to balance on your knees while on the toilet (not that I'd know). I regret not going the wireless route for headphones but found them cost-prohibitive.

Speaking of which, I would have stayed under budget had certain retail sites' original estimates for tax and shipping stood firm. I could've removed the sound card from the swap pile, but hey, the company's footing the bill. The result is a system any college student, closet writer, or submarine-dwelling audiophile would love.

Component	Model	Price
Case	Barebones System (including Motherboard & Shuttle SV24 with VIA Power Supply)VT8363A chipset[1]	$249
Motherboard	Integrated	N/A
Processor	VIA C3 900MHz[2]	$59.99
Memory	128MB PC133 SDRAM x 2[2]	$59.98
Hard Drive	Seagate Barracuda Ultra ATA/100 7,200rpm 80GB[3]	$129
Video Card	Savage4, integrated[1]	N/A
Sound Card	VIA audio with AC'97 CODEC, integrated; Creative Labs Sound Blaster 16 PCI (available for swapping with modem card)[4]	$29.99
Network Card	Realtek 8139C, integrated	N/A
Modem	Creative Labs 56Kbps V.90[5]	$19.60
CD-ROM	Samsung SW-224 24X10X40X CD-RW[6]	$78
Diskette	TEAC 1.44MB 3.5-inch floppy drive[3]	$19.50
Monitor	Envision EN-5100e 15-inch LCD[7]	$349.99
Speakers	N/A	N/A
Mouse & Keyboard	Logitech Optical Wheel Mouse and Cordless Freedom Optical Keyboard[3]	$75
Software	Roxio Easy CD Creator, integrated; Windows XP Home Edition; Microsoft Works Suite 2002[8]	$308
Miscellaneous	Jensen Headphones[5]	$24.99
Subtotal		$1,403.04
Shipping		$71.66
Tax		$47.02
Rebates		$0
TOTAL		$1,521.72

Purchased From:
1 Outpost.com
2 TigerDirect.com
3 Multiwave
4 Creative Labs
5 Best Buy
6 Essential Computer
7 CompUSA
8 ShopMicrosoft.com

And The Winner Is

When is small too small? At 6.75 inches high x 7.5 inches wide x 10.5 inches deep, Cal's system's footprint is wider than Samit's but not nearly as deep. But the tall and thin footprint (13.5 x 5 5/8 x 13 5/8) Samit chose doesn't really allow a user to set the monitor atop the case as Cal's does, thereby saving even more space. But in achieving the smallest footprint, did Cal have to sacrifice too many amenities to walk away with a win? Let's see:

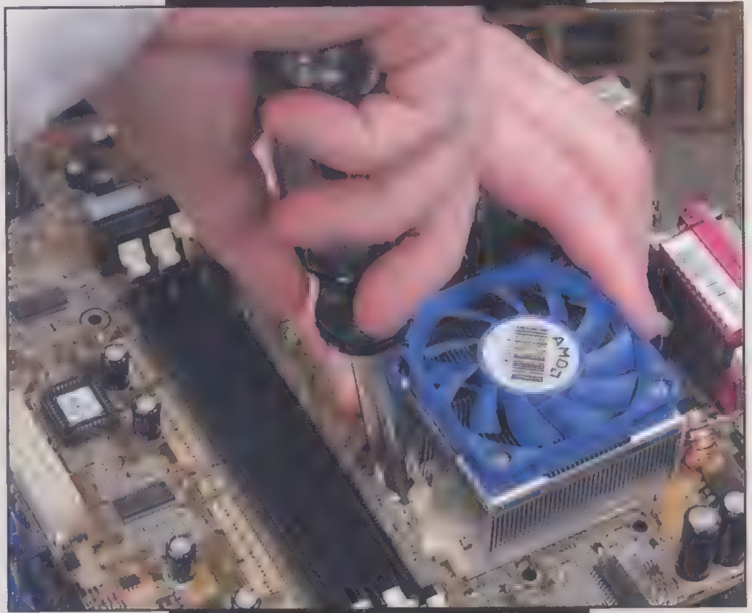
"The Fifth Element" looked great on Samit's system, as did Dungeon Siege. The DVD-ROM drive is a nice inclusion, the swiveling monitor is handy, and the wireless headphones are great. I was unimpressed with the range of Samit's Microsoft wireless mouse because it wouldn't work unless positioned near the infrared receiver. Cal's Logitech duo was much nicer. Add to that the fact that Cal's system has both IEEE 1394 and USB compatibility, and a roomier hard drive, and it better meets the technical requirements of the assignment: it's smaller. Yes, he's technically over budget, but as Cal offers the $29.99 sound card only as an alternative to the modem, I'll let it go. I hate to deny Samit the win after all the work he put into hacking together a workable fan, but Cal's system is a little smaller, and that's really all it takes for a win here. *–Jennie "The Ruler" Schlueter, content editor*

Swappin' Parts

There's A Transformation Taking Place

Each month in "Swappin' Parts," a Computer Power User *writer upgrades one out-of-date component in our test machine, MERLE (Mediocre Electronic Refurbished Low-end Equipment). When we're finished, we will have transformed MERLE from a silicon trash can into a powerful system we'd be proud to put in our own homes. To date, we've upgraded MERLE's CPU, sound card, speakers, video card, RAM, optical drive, case, PSU, and monitor. Whew.*

The denuded MERLE feels a bit of a draft now. Brr, Wilbur!



This clip on this AMD-supplied heatsink had the perfect slot for my screwdriver. Be careful here, though, not to stick or crack the motherboard.

Hey, MERLE's not looking as frumpy as he did the last time I operated on him for April's *CPU*. MERLE's new Lian Li case and Sony monitor really look swank. It's as if ZZ Top's "Sharp Dressed Man" is playing around MERLE, all the time.

This time around for "Swappin' Parts," editor Samit Choudhuri told me to spruce up MERLE's motherboard a little. I was thinking, "Hmm, can of pink spray paint, three bucks." Then he added that the company was buying. Heh, heh. I can spend other people's money like nobody's business, so I got right to work. Nothing but the best for my little buddy, MERLE!

After I wangled a little direction out of Samit, namely to stick with an AMD platform instead of changing lanes to Intel, I was on my own. I gleefully picked out a motherboard in about half an hour. Once again trying the limits of the company's patience, though, I opined that MERLE's new mobo would really work best with some faster RAM. Grudgingly, the company agreed.

After that initial step down the slippery slope, I mused aloud that it was a shame that new AMD-compatible motherboards supported Athlon XP processors, while MERLE still had a plain-Blaine Athlon. "Fine," the corporate corpus cried. "We'll buy an XP."

After a suitable interval, I tried to broach the subject of KryoTech cooling gear, but I had to scurry away, rat-like, in the face of a piqued purchasing agent. *Patience*, I thought to myself, *patience*.

Shortly after we ordered MERLE's new parts, Intel launched its new 2.53GHz Pentium 4 and "official" support for a 533MHz system bus. Big, longing sigh. The performance pendulum may have swung back over into IntelLand, as a new P4 system that had PC1066 RDRAM memory would be pretty hot. Then again, we don't want MERLE feeling any cockier. He's already experimenting with profanity, and I think I smelled cigarette smoke on his fan exhaust.

Parts Is Parts

Almost as much fun as having a blank check to buy computer parts is the opportunity to brag to y'all about what I got. Yo, peep this.

Motherboard. VIA's new KT333 chipset is described elsewhere, as in *CPU*'s May issue, so I won't reiterate here. Even though the KT333's bandwidth potential is kind of lost on the current crop of

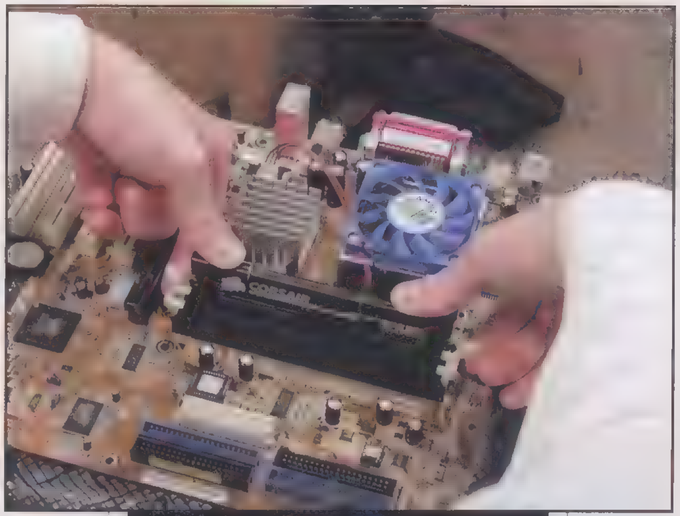
Athlons, it's still the fastest AMD-compatible chipset that VIA has fielded thus far. If you combine this with the ASUSTek name, you get the A7V333 motherboard.

ASUS mobos cost dear sums, but the quality speaks for itself. I've had fewer problems with ASUS boards than with other brands, which seems to mean more to me with every PC I build. Besides, I still break into "Beavis and Butthead" giggles whenever I see the ASUS Probe monitoring utility pop on-screen.

Besides the expected Athlon XP and DDR-SDRAM support, the A7V333 comes with a few enhancements I wish I'd waited for after buying a K7V266-E at home. The first is COP, which stands for CPU Overheating Protection. No current microprocessor will last long if its heatsink fan suddenly stops working, but as Tom's Hardware Guide discovered last fall, Athlon XP chips are especially apt to go "pffft!" when uncooled. Oops. AMD quickly figured out a fix, and ASUSTek is among the first manufacturers to address this little quirk. COP is a hardware feature—not just software—that can shut down the CPU as soon as it detects its temperature rising out of parameters. COP is only available in four or five ASUS mobos at this writing, but the company plans to make it a standard feature.

The A7V333's other neat features include USB 2.0 and IEEE 1394, built-in ATA/133 RAID, and 6.1-channel integrated C-Media audio. MERLE normally wouldn't give a fig about the audio, but it seems he's been lending out his Audigy Platinum sound card and Klipsch speakers lately. This makes it kind of unpleasant to hear his ZZ Top anthem over his POST buzzer.

RAM. Another prime reason to step up to a better motherboard was to pull MERLE out of SDRAM hell. Sure, SDRAM is still cheap, and years ago, it was even exciting. Now, though, there's the recently approved DDR333 spec and PC2700 DDR-SDRAM. Can any current AMD processor use more bandwidth than DDR266, aka PC2100, provides? Well, no, but I don't care. I'm planning for the future, and right now, PC2700 DDR is the bee's knees among non-RDRAM memory.



DDR only goes in one way. Press it down evenly, then snap the two side tabs into place. Installing RAM is fun

I got a 512MB stick of Corsair memory with a CAS (column address strobe) latency rating of 2 clock cycles. You can set CAS2 memory to access data faster than CAS2.5 or CAS3 RAM, and this ASUS mobo can handle it. The Corsair stick arrived fitted with a mean lookin' aluminum heat spreader, just like RDRAM modules. Never mind if its DRAM chips actually need it or not, it looks cool, regardless.

CPU. Of course, I couldn't let MERLE mope through his future existence with last fall's darling, the 1.4GHz Athlon Thunderbird. Who cares if it is chip enough to see him through any task he's likely to tackle? Not me, 'cause I'm not paying for it. It's time for an Athlon XP 2100+ (1.73GHz).

The Athlon XP has a few architectural improvements over the T-bird, such as hardware prefetch and support for Intel's SSE1 instruction set. However, the 2100+ will probably be the last 0.18-micron Palomino Athlon. It's not a bad idea to take Alex "Sharky" Ross' advice and wait a bit for the 0.13-micron Thoroughbred Athlons coming soon, but "Swappin' Parts" is about what's best at the moment.

This One's A Mother

My first thought as I sat down next to MERLE was, "Could we give him a bigger monitor and case next time?" I mean, I'm not a big guy anyway, but I felt like Mini-Me sitting next to MERLE's 21-inch Sony monster and Lian Li tower case. Of course, there were benefits to working behind MERLE-henge. With MERLE's new bulk hiding me from revision-obsessed editors, I stood a chance of getting some work done for a while.

First of all, I glanced through the documentation that came with the new ASUS motherboard and the Athlon. If it's your first time doing something like this, read the docs cover to cover. As I expected, ASUS included a thorough manual with the A7V333, complete with **header** (male connectors built into the motherboard) maps, BIOS setting explanations, and jumper settings. You can ignore most of the last, as by default, you can adjust most settings in the BIOS.

It's easier to install a CPU and heatsink when the motherboard is out of the PC. I pulled the new ASUS board from its antistatic plastic bag, trying to touch it only by its edges. Next, I set it down on the same antistatic bag and placed that on top of the ASUS box and the thin foam sheet that came in it. This let me work on the mobo without worrying about damaging it on a hard surface.

I used a fingernail to pull the CPU socket's metal lever slightly to the side, and I then raised the lever perpendicular to the motherboard. Next, I lined up the Athlon's two corners without pins with the socket's corners without holes and made sure the chip dropped right in. Finally, I lowered the socket lever to clamp the Athlon's pins and clipped it under the socket's retaining ridge.

We bought a boxed, retail Athlon, which means it came with an aluminum heatsink and a 5,400rpm fan. The fan looked cheap, but the heatsink had skived fins that were thin and close to one another. Skived heatsinks tend to have more total fin surface area and better heat dissipation than heatsinks with cast fins or spines.

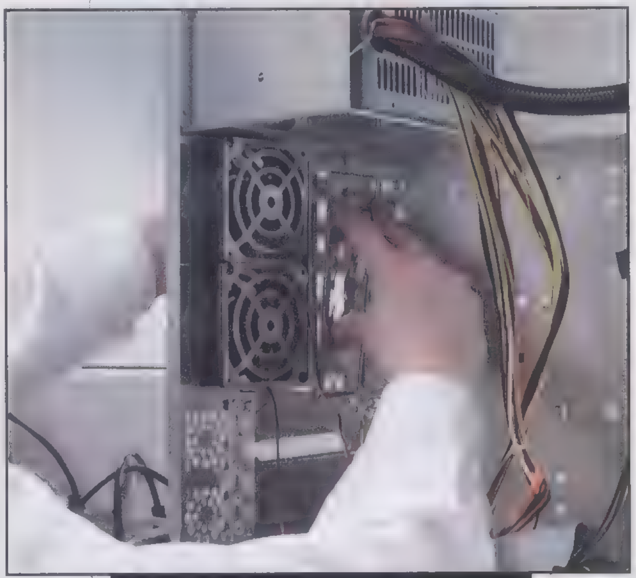
The heatsink also had a square of unidentified thermal transfer sludge under a patch of plastic tape. This crucial stuff helps the heatsink siphon heat from the CPU's die by filling tiny gaps between the two. I knew I had to remove the tape before attaching the heatsink—don't neglect this step—but first I did a gentle fit test without removing the tape.

A spring steel clip holds most heatsinks to plastic tabs on the motherboard's socket. One end of the clip may have a place for your fingers or a screwdriver to apply pressure, so always hook the other end to the socket first. I had a flat screwdriver that fit one end of the heatsink clip exactly, which pleased me greatly.

I checked to make sure that the clips aligned with the socket tabs and that the heatsink's bevel didn't reach the socket's raised lip, and then I removed the heatsink again. Even though new Athlons have four round cushions to help keep tight heatsinks from cracking their dies, most do-it-yourselfers pay a few bucks for a metal shim that sits on top of the Athlon. Just as I was curious about the thermal sludge, though, I was interested to see how well the Athlon retail kit fit together sans shim. If AMD sold it this way, I reassured MERLE, it's good enough for him.

Next, I cleaned the Athlon's die with a cloth and a little rubbing alcohol and let it dry. I peeled the tape from the heatsink's thermal goop, hooked the heatsink clip's small end on the socket, and tried to lower the heatsink straight down onto the Athlon as much as possible. I then used my screwdriver's tip to press the other end of the clip down and inward until it grabbed the socket tab. Be extremely careful with this; don't slip and gouge the mobo with the screwdriver, and make sure the heatsink is sitting squarely on the chip before you attach the clip. I routed the fan's power lead to the CPU fan header on the motherboard and saw that it was good.

Finally, I inserted the new Corsair memory into the first DDR slot by the CPU. I pushed the plastic retaining clips aside at first and then snapped them back into place after the RAM slid home.



Our photographer labeled this one "pushing metal thingy from the back of the case." That about sums it up for removing the old rear ATX panel.

Play Me Some Mountin' Music

As Madeline Kahn says in "Blazing Saddles," it was time to get down to "bwass tacks" and pop MERLE's top. I shut him off and then removed his side panel. Don't forget to unplug your PC's power supply and touch the metal case every few minutes to dispel static.

The ASUS board came with a motherboard map in the form of a largish sticker, which I peeled off and affixed to the inside of MERLE's side panel. Next, I disconnected everything from MERLE's motherboard inside and out, including the monitor cable, ATX power supply connector, and front-panel indicator LEDs. I unscrewed the RADEON video card next and pulled it. Finally, I removed the old motherboard's screws, top ones last, and lifted it out of the body cavity, er, case. I treated it better than I felt like doing because I wasn't certain the new mobo would work. (That's not to say the old Biostar didn't become a clay pigeon later, but that's another story.)

Next, I held the new motherboard in the case long enough to see that I needed to change the rear ATX panel to make the connectors match the case's holes, add a few mounting studs for the wider mobo to screw into, and remove some studs where the ASUS board did not have holes. I popped out the old rear panel by pressing it inward from the outside. ASUS had packed the proper panel with the mobo, so I proceeded to press it into the case. Afterward, I rearranged the Lian Li case's mounting clips to support the new mobo. You don't necessarily need to put a stud under every hole, but I always try to support both ends of RAM and PCI slots because users may shove different sticks and cards in these as time goes on. Ditto for IDE and RAID headers. The reason I removed the studs without corresponding holes was to prevent possible short circuits. Better safe than sorry.

Finally, I checked once more that the ASUS board fit both the mounting studs and the back panel. The latter is littered with fiendish metal grounding clips that go everywhere but where you want them, which is alongside and among the rear connectors. I bent a few so that they still contacted the PS/2 and USB connector housings but let me actually install the board. I screwed the motherboard down in a scattered pattern, like the head bolts on an engine, but not *too* tightly.

After connecting the power, front switch, and LED cables (the white lines were grounds, by the way), and installing the video card and monitor cable, I turned MERLE back on. One beep said he'd POSTed correctly, so I pressed

DELETE to get into his new BIOS settings. You'll only have a few seconds to do this, so restart your PC if you miss your chance.

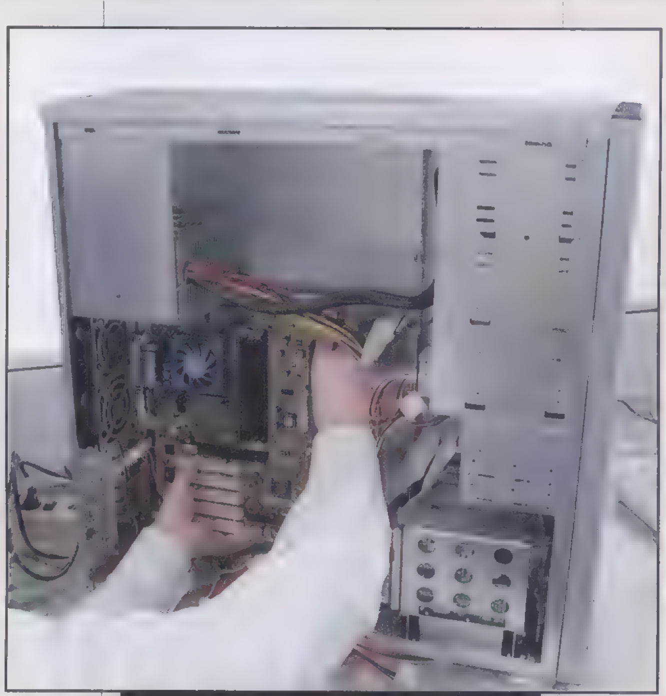
Attitude Adjustments

In the BIOS' Main page, I set MERLE's time and date. Arrowing over to the Advanced page, I had to set the CPU Speed to 1733MHz manually. If you skip this step, you may find yourself inexplicably running a very expensive 1GHz machine.

Next, I went back to the BIOS' Advanced page. Under Chip Configuration, I set the SDRAM Configuration to User Define. This let me set the CAS Latency to 2T, the RAS to CAS Delay to 2T, the RAS Precharge Time to 2T, and the Active Precharge Delay to 5T. These voodoo settings push the RAM to its speediest, but I wrote down the old settings in case MERLE became unstable later. I pressed F10 and clicked OK to save my changes and exit the BIOS, and then I watched MERLE POST.

Of course, without any boot media, MERLE could only sit and spin. I shut him off and connected his hard drive, CD-ROM, and floppy cables, and then rebooted again. MERLE's Windows Me is probably my least favorite OS, but it does have one advantage over WinXP in that it can survive a motherboard swap.

Anyway, WinMe detected a zillion new hardware items, and I helped it along by clicking Next and Finish as necessary. When it asked if I wanted to reboot, however, I clicked No. I tossed the ASUS installation CD into MERLE's CD-ROM drive, and . . . nothing. WinMe had forgotten how to detect MERLE's 1996-vintage Toshiba drive. I called up the Add Hardware Wizard in the Control Panel and installed a Mitsumi double-speed CD-ROM controller. This did the trick. After a reboot, MERLE had a CD-ROM again.



Once the studs match the holes, mount away. You may have to bend a few metal tabs on the rear ATX panel to make things mate up, but don't go nuts.

I clicked Start, Run, and then Browse to get to the ASUS CD's BIN folder where I double-clicked Assetup.exe and clicked OK. This let me install important updates and drivers, such as VIA's ubiquitous 4-in-1 driver.

> I have a tube of Arctic Silver II thermal grease standing by in case MERLE goes overclocking later.

MERLE's Permanent Record

I had wanted to run SYSmark2001 and PCMark 2002 after installing each new component, but time constraints got in the way. I ended up following the traditional "Swappin' Parts" avenue of testing after I installed everything. MERLE's new SYSmark scores surprisingly *doubled* with this swap. These included a 154 score in Internet Content Creation, 121 in Office Productivity, and 137 Overall. Before this mobo swap, MERLE had a 79 in Internet Content Creation, a 65 in Office Productivity, and a 72 Overall. His PCMark scores of 5,095 CPU, 3,349 Memory, and 832 HHD ain't bad, either. When you consider that we only changed MERLE's RAM speed and not its quantity, along with a speedier chipset and a mere 333MHz faster CPU, MERLE's metamorphosis is even more remarkable.

I was a little nervous that the thermal goop that came preapplied to the retail Athlon XP's heatsink wouldn't keep the 1.73GHz chip cool enough. MERLE's 51-degree Celsius CPU temperature just standing still doesn't exactly look frigid, but it's not completely out of line. I have a tube of Arctic Silver II thermal grease standing by in case MERLE goes overclocking later. All that's left at this writing is to tie MERLE's cables out of the way and figure out exactly how to attach each individual wire for his front USB ports. I may even reboot in Safe Mode to delete any obvious ghost drivers for the old motherboard in Device Manager. That's if I am feeling altruistic.

To Infinity & Beyond

Hey, it looks like MERLE has well and truly morphed. We almost have enough leftover parts to reconstruct the original MERLE once again, maybe as something to foist on that beloved aunty who's been anxious to "download the Internet" since her bridge club started a listserv. Or, perhaps, maybe to get a showdown between the original MERLE and the new anti-MERLE Cal Clinchard theorized in May's *CPU.*

Stay tuned for next month, as we aim to make MERLE a bit more comfortable by grooming his cables and possibly adding a fan or two.

by Marty Sems

XtraView+
NEC
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NEC

See more of your ideas.
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NEC/MITSUBISHI
NEC-MITSUBISHI ELECTRONICS DISPLAY

X-ray Vision: PC Vulnerabilities

For most people, computers experience plenty of vulnerabilities that aren't the computer's fault: a spilled Mountain Dew on the keyboard, dog fur floating into the cooling fan, or a 3-year-old testing the capacity of the CD-ROM drive for storing potato chips. Then there's your "fist of death" that crashes through the monitor when it displays the "blue screen of death."

So when you read—continually, it seems—of various vulnerabilities in your computer's operating system, Web browser, and other software packages, it's all you can do to prevent your fist of death from visiting your computer's software vendors. Unfortunately, we might be only at the crest of the hill when it comes to finding new computer vulnerabilities, and it's a steep ride down.

A Higher State Of Awareness

The discovery of vulnerabilities in computing hardware and software is occurring more frequently for a few reasons:

- The Sept. 11 terrorist attacks on the United States made technology companies far more conscious of security issues in their products.
- More independent companies and individuals have made it a priority to seek out security holes.
- As software vendors build more complexity and more layers into their packages, security holes are more likely to occur.
- With thousands and thousands of new Internet users every day, the chance of spreading viruses increases, which brings more awareness to security holes.

Risk & Reward

Even though Sept. 11 has encouraged companies to pay more attention to security holes in their products, critics say that companies still are not doing enough. Companies might be doing a better job of alerting customers and end users to potential security vulnerabilities, but it still irks critics that the security weaknesses even make it to the marketplace in the first place.

Companies could test products stringently enough to find the vast majority of security holes, but they'd then have to delay the product's release date by six months to a year, something that's not financially

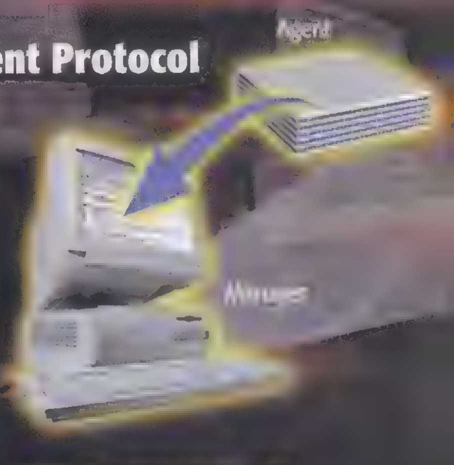
Recent Vulnerability: Simple Network Management Protocol

SNMP (Simple Network Management Protocol) is a protocol to manage networked devices. It's used today by several vendors in networking hardware and software, including products such as routers, switches, hubs, operating systems, digital cameras, networked printers, and broadband modems.

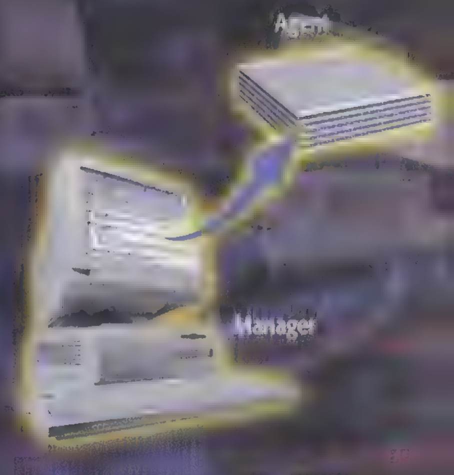
SNMP devices send a variety of messages between agents (the end device, such as a router) and the manager (the device controlling the agent). One such message, called a trap message, provides notification to the manager of errors in or the general status of the agent. Trap messages are unsolicited by the manager in most cases. Another message, called a request message, lets the manager send commands or information to the agent.

In recent studies, researchers have discovered potential vulnerabilities in SNMP version 1. These SNMP vulnerabilities could let hackers gain unauthorized access to a network, destabilize the network, or launch denial of service attacks. Although most home users don't deal with SNMP, network users with SNMP-related products will want to download the latest patches from hardware and software vendors. Experts recommend disabling any nonessential SNMP features to further protect the network. Some network managers may want to limit the accessibility of outside traffic to the network if SNMP features cannot be disabled.

These illustrations outline two of the possible SNMP version 1 vulnerabilities: buffer overflow and a denial of service attack.



1 The agent sends a trap message to the manager, alerting the manager to its status.



1 The manager sends an SNMP request to the agent.

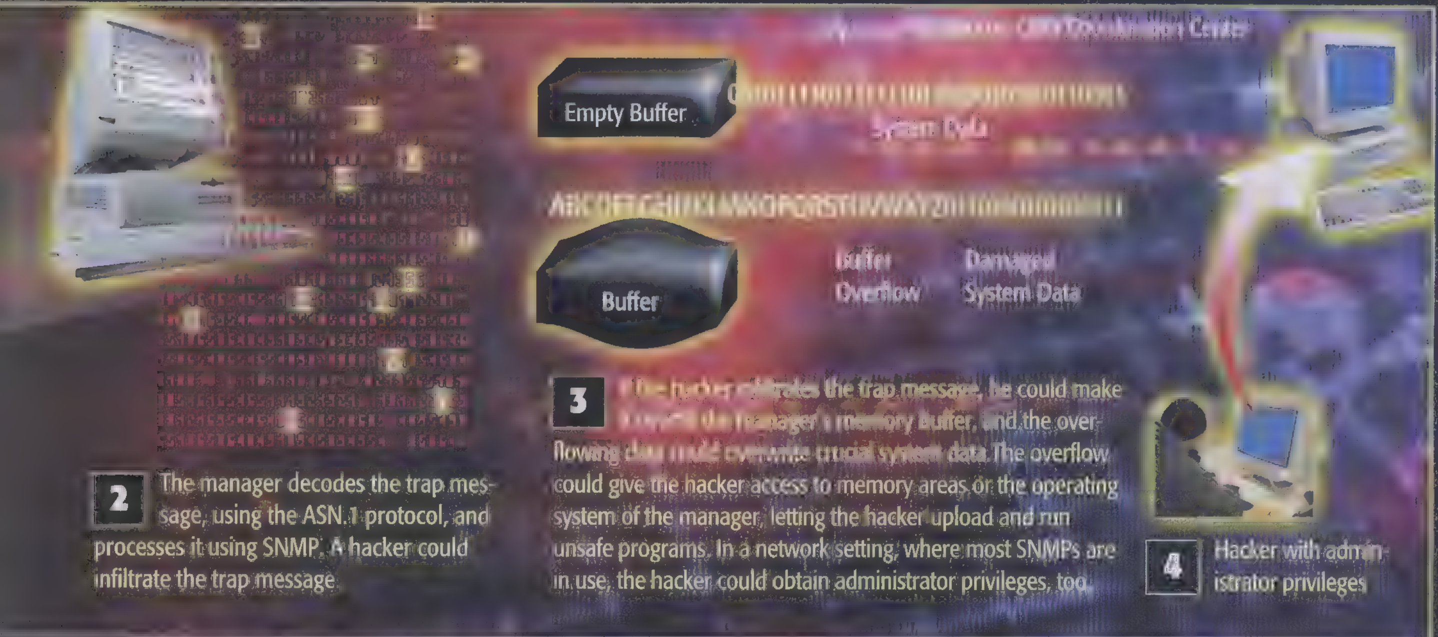
advantageous in a highly competitive market. It's easier—and cheaper—for the companies to release a product with some security holes and then release patches periodically over the next couple of years until releasing a new version of the software.

For some companies, it's also cheaper to have security experts and individuals find the security holes in independent testing rather than having the company spend a lot of money on its own testing. Until consumers have had enough with product vulnerabilities and begin kicking companies that release buggy software where it counts—square in the revenues—experts say offending companies will have no incentive to eliminate the vulnerabilities.

Mr. Fix It

Even if you aren't very handy around the house, you can easily play Mr. Fix It when it comes to computer security holes. One thing you could do is install a personal firewall to thwart most hackers who are trying to exploit a security hole. You should also check regularly for software patches. Maybe set up a routine where you check for patches each month when your broadband Internet access bill arrives. Finally, wait a few months to buy new products until the manufacturer has worked through most bugs. This might be tough for those of you addicted to the newest technologies, but it might represent the difference between having a well-running PC and having a bug-filled computer that's a hacker's paradise. CPU

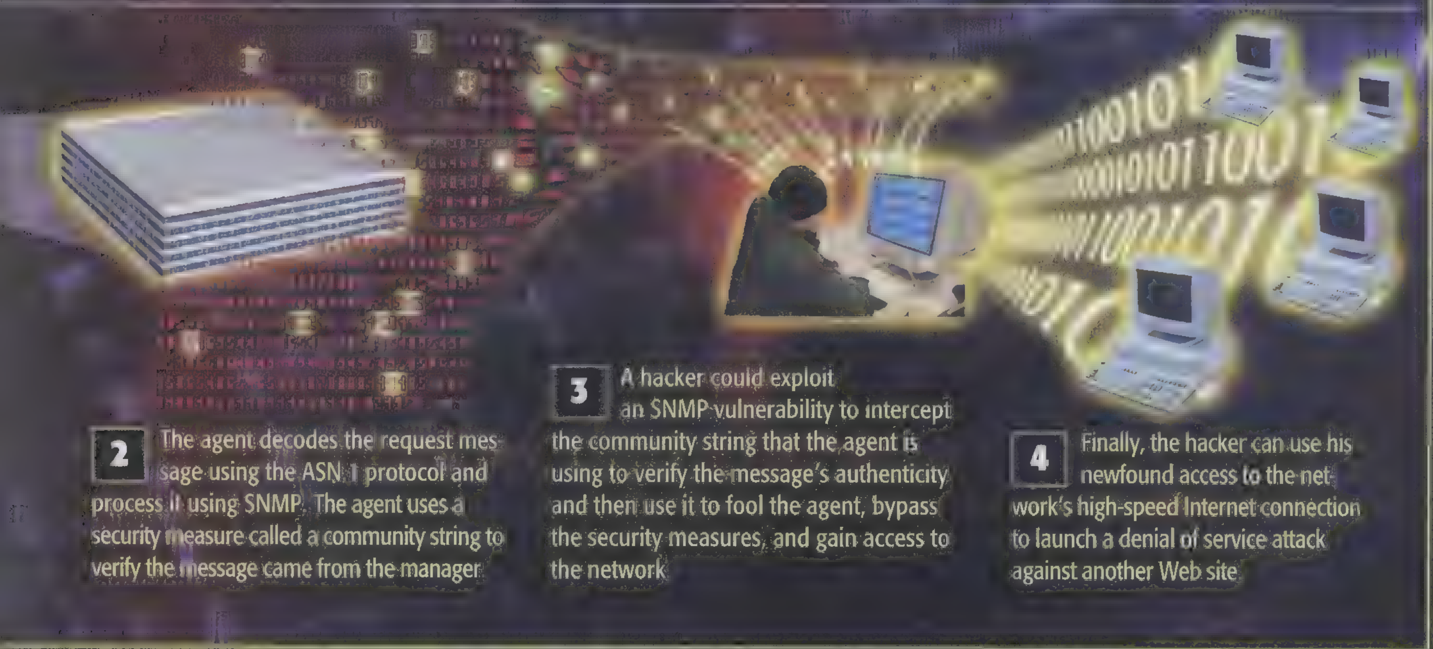
by Kyle Schurman



2 The manager decodes the trap message, using the ASN.1 protocol, and processes it using SNMP. A hacker could infiltrate the trap message.

3 If the hacker infiltrates the trap message, he could make it overfill the manager's memory buffer, and the overflowing data could overwrite crucial system data. The overflow could give the hacker access to memory areas or the operating system of the manager, letting the hacker upload and run unsafe programs. In a network setting, where most SNMPs are in use, the hacker could obtain administrator privileges, too.

4 Hacker with administrator privileges



2 The agent decodes the request message using the ASN.1 protocol and process it using SNMP. The agent uses a security measure called a community string to verify the message came from the manager.

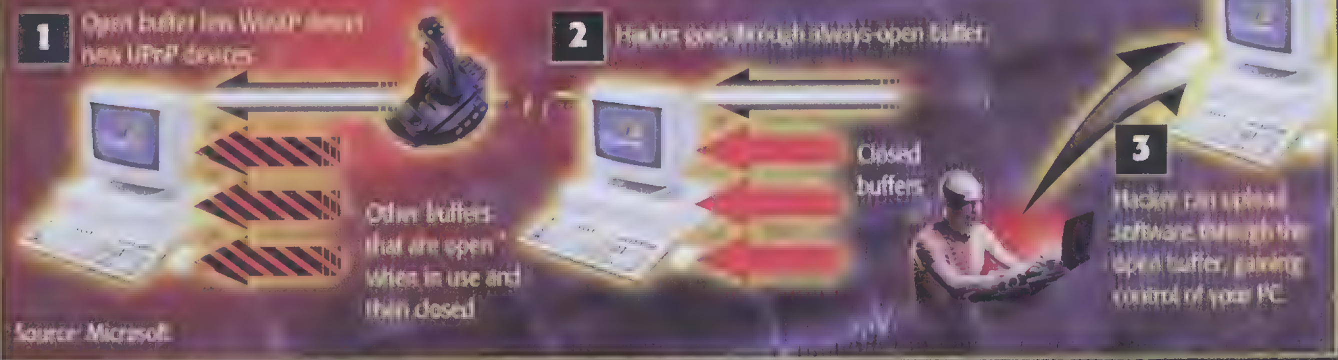
3 A hacker could exploit an SNMP vulnerability to intercept the community string that the agent is using to verify the message's authenticity and then use it to fool the agent, bypass the security measures, and gain access to the network.

4 Finally, the hacker can use his newfound access to the network's high-speed Internet connection to launch a denial of service attack against another Web site.

Graphics & Design: Carrie Benes & Jason Codr

Recent Vulnerability: Windows XP

If you're a Windows XP user, you may have a security vulnerability. WinXP's UPnP (Universal Plug and Play) feature is automatically active when you install the OS. However, this feature leaves a back door buffer open that the OS doesn't automatically close. Through this buffer, a hacker could mimic a UPnP device to gain access to your computer. He could then install software on your computer, letting him gain access to various aspects of your computer. The hacker could damage your computer or launch attacks against other computers using your Internet connection. You can fix this vulnerability by using a firewall or downloading the latest WinXP patches. Win98 and WinMe also have a similar vulnerability through the Internet Connection Sharing feature.


1 Open buffer lets WinXP detect new UPnP devices
Other buffers that are open when in use and then closed
2 Hacker goes through always-open buffer
Closed buffers
3 Hacker can upload software through the open buffer, gaining control of your PC.

Source: Microsoft

Recent Vulnerability: Internet Explorer

You can fix these six vulnerabilities, which affect IE versions 5.01, 5.5, and 6, by downloading the latest IE patches.

Buffer Overrun

The hacker causes a buffer overrun in IE, which leaves a port open and lets the hacker upload code through IE.

GetObject Function

The GetObject function runs a security check on anyone trying to access the OS through IE. However, a hacker can give a certain piece of false security information, bypassing the security checks and gaining access to files on the PC.

File Download Window

In IE's File Download window, a hacker can fool the Content Disposition HTML header fields into displaying a different name for the file in an effort to trick the user into downloading it.

HTML Header

Through an HTML header vulnerability, a hacker can force IE to use any program, even one the OS has labeled "unsafe," to open any type of file, bypassing the program the OS usually uses.

Disabled Scripts

If you have disabled scripts in IE, the browser runs a security check for scripts when a page loads. A hacker later could force a certain series of events, though, that would let a dangerous script run.

Frame Domain Verification

Through the Frame Domain Verification feature, a Web site operator could open a mirrored IE window, letting the operator display data from the user's PC, including file contents. The operator can't change the data, though.

Source: Microsoft

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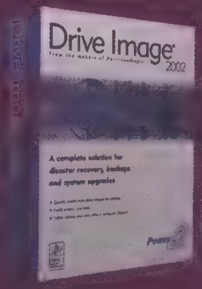
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USB 2.0 vs. IEEE 1394

Connection Competition

In nearly every conflict, there's a winner and a loser. The early bird vs. the worm. The dog's teeth vs. your favorite slippers. Any NFL Super Bowl team vs. the Buffalo Bills. It's a rare conflict where two combatants can learn to peacefully coexist. In the battle over the standard for high-speed data transmission between a computer and its peripheral devices, though, we might be seeing one of those rare instances where two standards get along.

Both USB 2.0 and IEEE 1394 (the standardized name of the technology Apple developed and named FireWire; it's usually shortened to 1394) have carved strong niche markets in the world of high-speed data transfers. Although both standards are in the midst of major improvements and it'll be several months before this conflict over standards plays itself out completely, the ultimate winner in this battle could be consumers. If USB 2.0 and 1394 can coexist, consumers will be able to take advantage of the unique benefits of both.

USB 2.0

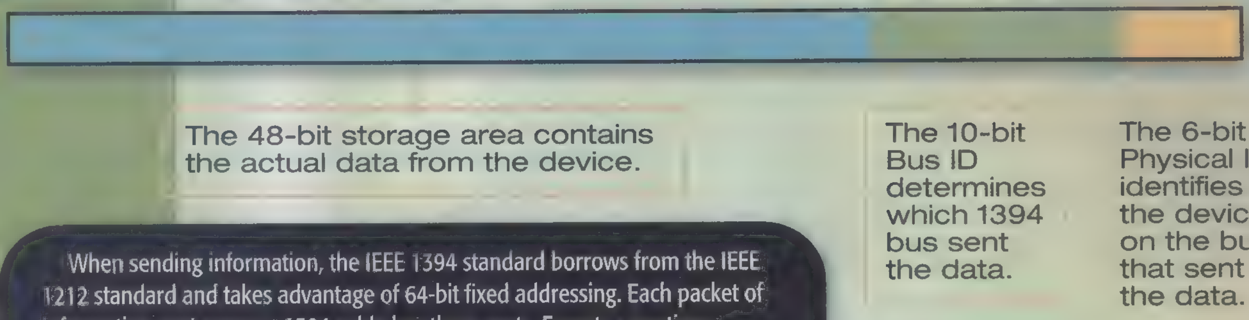
USB initially appeared as an improvement to older serial and parallel ports used to connect devices such as printers and scanners to the PC. Compaq, Intel, Microsoft, and NEC collaborated on the first USB project, beginning in 1994. USB 1.0 appeared in 1996, and USB 1.1 appeared in 1998. USB 1.1 is still a common standard in many of today's computers. Work on USB 2.0 began in 1999, and the finalized standard initially appeared in 2000. USB 2.0 offers speeds of up to 480Mbps for data transfers. That's a 40-fold improvement over the USB 1.1 standard, which operated at about 12Mbps for full-speed hardware devices and at about 1.5Mbps for low-speed hardware devices.

Hubs are the key to the USB architecture. A USB hub lets you connect several USB devices to the computer. You plug the devices into the hub, and the hub then plugs into the computer. Because most computers have one or two USB connections, a hub lets users run several USB devices from one USB connection on the computer. Hubs appear in both powered and unpowered versions. USB devices can draw a small amount of electrical power from the computer through the USB cable. If the cable doesn't provide enough power, though, you can use a powered hub to provide additional power for the devices. Most high-powered USB devices, such as a printer or an external hard drive, will use their own AC adapter power sources.

USB adoption. Nearly all computers sold in the past 18 months include support for some form of USB, whether it's USB 1.1 or USB 2.0. Cahners In-Stat/MDR estimates that about 750 million computers equipped with USB support will be in use by 2004. Overall industry support, at least initially, for USB 2.0 was slower than expected, though. Part of the problem was the fact that Microsoft didn't include support for USB 2.0 in its initial release of the WinXP OS. The lack of support in WinXP was especially curious, considering Microsoft is on the USB Implementers Forum board of directors. Without support built into an OS, it's difficult for a new technology, such as USB 2.0, to achieve immediate success.

Microsoft included support for USB 2.0 in a WinXP update in February 2002. The USB 2.0 support in WinXP encouraged computer manufacturers to begin building

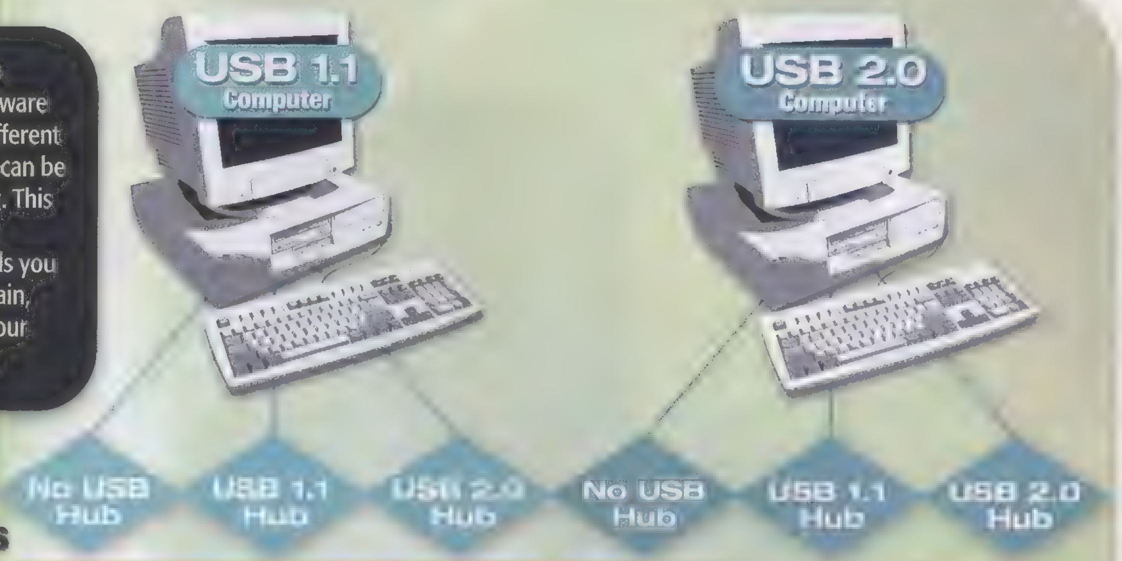
64-bit Packet Of Data Using IEEE 1394


The 48-bit storage area contains the actual data from the device.
The 10-bit Bus ID determines which 1394 bus sent the data.
The 6-bit Physical ID identifies the device on the bus that sent the data.

When sending information, the IEEE 1394 standard borrows from the IEEE 1212 standard and takes advantage of 64-bit fixed addressing. Each packet of information sent across a 1394 cable has three parts. Experts sometimes combine the Bus ID and the Physical ID and call them the 16-bit Node ID.

Confilicting USB Standards

Attempting to implement hardware that supports different versions of USB can be a little confusing. This chart shows the maximum speeds you can hope to obtain, depending on your hardware setup.



Device Types	USB 1.1 Computer: No USB Hub	USB 1.1 Computer: USB 1.1 Hub	USB 1.1 Computer: USB 2.0 Hub	USB 2.0 Computer: No USB Hub	USB 2.0 Computer: USB 1.1 Hub	USB 2.0 Computer: USB 2.0 Hub
Low-speed (USB 1.1)	1.5Mbps	1.5Mbps	1.5Mbps	1.5Mbps	1.5Mbps	1.5Mbps
Full-speed (USB 1.1)	12Mbps	12Mbps	12Mbps	12Mbps	12Mbps	12Mbps
High-speed (USB 2.0)	12Mbps	12Mbps	12Mbps	480Mbps	12Mbps	480Mbps

PCs with support for USB 2.0. In January 2002, Gateway was the first PC maker to add support for USB 2.0 in its computers. However, it was tough to find off-the-shelf computers with support for USB 2.0 until the spring of 2002. As USB 2.0 peripheral devices began appearing late in 2001, computer manufacturers had to include add-on cards to allow the computers to use the USB 2.0 devices to their full capacity. Without the USB 2.0 add-on cards, the USB devices would operate at slower speeds as were found in USB 1.1.

Lack of integration. The other problem for increased adoption of USB 2.0 has been a lack of integration for the standard in the microprocessor chipsets for budget and midrange computers. Computer manufacturers looking to build support for USB 2.0 in the less expensive units had to include additional chips with the microprocessor chipset, which increased costs. For the budget computers, this additional cost was more than the manufacturer wanted to incur.

However, Intel is expected in mid-2002 to introduce a new Pentium 4 chipset that will provide integrated support for USB 2.0 for budget and midrange computers. The chipset will support USB 2.0, giving many more consumers the option of easily adding USB 2.0 peripheral devices and gaining the most benefits. Industry analysts expect

Data Transfer Speeds

Recent technological advances have made incredible strides in improving the speed of data transfers.

Type	Introduced	Top Speed
Serial ports	Mid-1960s	20Kbps
Parallel ports	Early 1980s	1Mbps
SCSI-1	Mid-1980s	40Mbps
USB 1.1	Mid-1990s	12Mbps
USB 2.0	Late 1990s	480Mbps
IEEE 1394	Mid-1990s	400Mbps
IEEE 1394b	Early 2000s	800Mbps

that incorporation of the new chipset will increase the number of companies building USB 2.0 peripheral devices, as well. While the early USB 2.0 devices included scanners, optical drives, and digital camcorders, the new Intel chipset should hasten the introduction of digital cameras and printers that support USB 2.0.

IEEE 1394

1394 began as a technology Apple developed in the mid-1990s as a means for connecting Macintosh computers to peripherals in a fast and easy manner. Apple gave the technology the name FireWire, but the technology was eventually standardized under the name IEEE 1394. Sony, like Apple, has its own trademarked name for the technology: i.LINK. 1394 was originally a replacement for the SCSI interface used on early Macintosh computers. 1394, which is a serial type of bus, offered both an improvement in speed and in ease of use over SCSI. 1394 currently offers maximum data transfer speeds of 400Mbps, although a faster version is in development.

For the most part after its introduction, 1394 operated behind the scenes. Early on, it only appeared on computers that Apple or Sony built. It was also popular on digital camcorder devices and with those performing video editing. The large data files involved with video editing made a high-speed data transfer option, such as 1394, a necessity. Apple even won an Emmy award for engineering in 2001 for its development of 1394 technology.

Not just Apple. As high data transfer speeds became more important for other types of peripherals, other computer manufacturers began looking toward 1394. In the past few years, Apple has been licensing 1394 technology to other computer manufacturers. Delays in the implementation of USB 2.0 in WinXP and in microprocessor chipsets made more manufacturers look at 1394.

An IEEE 1394 Daisy Chain

The 1394 standard lets 1394-enabled devices make a connection at any point along the cable. Each device along the daisy chain is known as a hop. You can send data through as many as 16 hops. In this example, the digital camera is three hops from the computer.

USB Predicted To Maintain PC Peripheral Control

According to estimates from Cahners In-Stat/MDR, devices featuring USB connections should continue to maintain an advantage over 1394 devices in the PC peripheral arena.

USB-Equipped PCs & Peripherals	1394-Equipped PCs & Peripherals
2002: 400 million	2002: 75 million
2003: 500 million	2003: 100 million
2004: 600 million	2004: 140 million
2005: 675 million	2005: 200 million

Microsoft built support for 1394 into its original release of WinXP in part because more hardware devices supported 1394 than USB 2.0 at the time WinXP appeared. Microsoft was also emphasizing WinXP's strengths in handling digital video; 1394 has always worked well with digital camcorders because of its high-speed data transfers compared to USB 1.1.

Some of 1394's best features include the ability to install multiple devices on a single bus, the ability to hot-plug devices, and its low implementation costs. 1394 can also provide electrical power from the computer to the connected peripheral device. The 1394 cable doesn't carry a lot of power, but it does let you run some low-power devices without batteries or an adapter. Devices requiring more power, such as an external hard drive, would need their own power source.

Some Differences

Although USB 2.0 and 1394 are similar technologies, they do have a few key differences. These are separate from the differences in how they handle digital video, which we discuss in the "1394's Digital Video Stranglehold" sidebar.

Number of devices. 1394 can run as many as 63 devices on a single connection, while USB can run 127 devices. Then again, most personal users might not need to worry about this difference. After all, how many times are you going to run more than three, four, or 50 devices at once?

Networking system. USB 2.0 runs off a hub network topology, meaning each device makes a direct connection with the computer in the center, or hub. 1394 uses a daisy chain network topology, meaning all devices connected along the 1394 cable can communicate with other devices.

Communications. USB 2.0 devices use a host-based method of communications, meaning they need to first connect to a computer before communicating with other USB devices. Two 1394 devices don't require a computer to communicate. 1394 uses a peer-to-peer method of communications.

The Future

High-speed USB and 1394 connections could change the face of the computer over the next few years. For example, ultra-thin, ultra-basic notebook computers would be possible. Users could add a multitude of components, such as additional hard drives or optical drives, to suit their needs through external peripherals using a high-speed USB or 1394 connection.

Desktop computers should be much smaller and lighter, too, allowing for greater flexibility through a USB or 1394 connection. Users would have more control over deciding which devices they wanted to purchase to use with their computers. Many devices that are now internal, such as hard drives and DVD drives, could become almost exclusively external, letting users share them between computers. Consumers would have many more options for adding peripherals than they've had in the past.

1394's Digital Video Stranglehold

If there's one area where 1394 holds a distinct advantage over USB 2.0 in terms of implementation, it's DV (digital video). Typically, DV editors and others who work with DV are big fans of 1394. 1394 was the original choice of DV editors because its data transfer speeds were much higher than what was available with USB 1.1. Even though USB 2.0 now offers better data transfer speeds than the original 1394 standard, most industry analysts think 1394's firm entrenchment as the industry's standard will be almost impossible for USB 2.0 to unseat.

Perhaps the most obvious example of this theory was Microsoft's decision to include support for 1394 in the original release of WinXP in an effort to highlight the DV capabilities of WinXP. Support for USB 2.0 in a WinXP update appeared several months after the original WinXP release, but the original message about 1394 was hard to ignore.

1394 also supports isochronous mode in devices, which is important in DV. When using isochronous mode, a 1394 device can ask the computer to give it enough exclusive bandwidth to allow a smooth data transfer, such as a digital camcorder sending an uncompressed, real-time video file to the computer. 1394 can use asynchronous mode for more traditional data transfers. Without 1394's initial support for an important feature like isochronous mode, more DV editors might have gravitated toward USB, which also supports both isochronous and asynchronous modes.

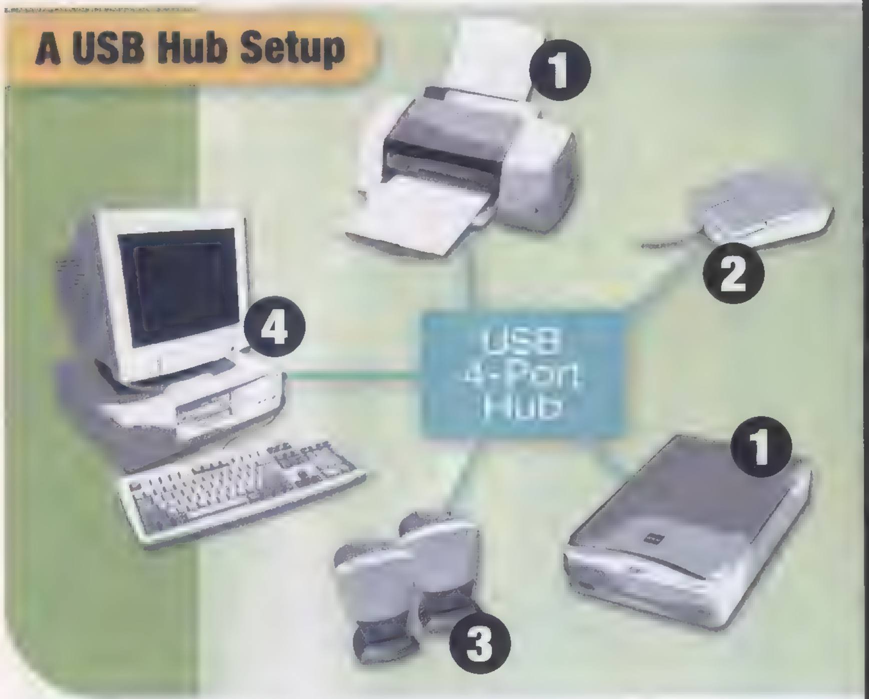
Finally, you can make a direct connection between two 1394 devices without the need for a computer as an intermediary, as you need with USB. Even those who support USB often say 1394 should be the dominant technology for use with consumer electronic devices, such as digital camcorders and digital VCRs.

Such features will make it difficult for USB 2.0 to make significant inroads to 1394's dominance in the DV market.

The IEEE 1394 Cable

1394 uses two twisted pair sets (shown in blue and red) to carry the data inside a 1394 cable. The cable also contains two power conductors (shown in black) that carry low amounts of electrical power to 1394 devices. Devices that require low amounts of electrical power can draw power from the computer through the 1394 cable. High-power devices, such as an optical drive, still need their own external power sources.

A USB Hub Setup



In a USB hub setup, the computer connects to the USB hub device. You then plug USB devices into the hub, giving them access to the computer, also called the host.

When you turn on the computer, it goes through a series of steps to identify and communicate with the USB devices in a process called enumeration. During enumeration, the host determines which types of data the devices will send or receive.

1 A printer or scanner would receive and send data in a bulk transfer mode, meaning large blocks of data (usually 64 bytes at a time) are sent and received. The device or the host will check the blocks for errors.

2 A mouse would send data in interrupt transfer mode, meaning the device sends only small amounts of data at a time and sends the data sporadically.

3 A set of speakers would receive data in isochronous transfer mode, meaning it receives data in real-time with no error correction.

4 The computer can send commands to the various USB devices using a transfer mode called control packets.

In most instances, the USB host maintains the majority of its available bandwidth, usually around 90%, for isochronous and interrupt devices. Control packets and bulk devices receive the other 10% of the available bandwidth.

Some experts believe USB 2.0 will continue as the industry standard for connecting peripheral devices to computers because computer users are already familiar with using USB with their computers. The fact that USB 2.0 is backward compatible with USB 1.1 should make consumers more willing to make the switch to USB 2.0 devices. USB 2.0's maximum transfer rate of 480Mbps also makes it very attractive compared to 1394's current rate of 400Mbps.

However, plans are in the works to improve 1394's data transfer speeds. The next version of 1394 (version 1394b) should offer maximum data transfer rates of at least 800Mbps. 1394b will also feature support for both fiber-optic and copper cables, which will allow longer-distance data transfers. The specifications for 1394b have been finalized, and companies have demonstrated a few products, but 1394b products probably won't appear in significant numbers for at least the next six months.

Once its data transfer speed takes the lead, many industry analysts think the next version of 1394 will remain the dominant standard for connecting various consumer electronics devices. It might be difficult for 1394 to make widespread penetration into the stronghold USB has over computer connections, though.

Bottom Line

Industry analysts expect that consumers will continue to see implementation of both types of high-speed peripheral connections. The success of both standards makes it difficult to choose between the two. You'll want to do your homework when considering devices that support one standard over the other. (We'd advise against letting your 4-year-old use "Rock, Paper, Scissors" to make the decision for you.)

Perhaps we'll see more manufacturers follow the route of Iomega and a few other companies. By the time you read this, Iomega expects to begin offering an external hard drive that offers support for both USB 2.0 and 1394. This will let users swap between the two standards, saving them from having to make a tough decision.

by Kyle Schurman

The USB Cable

A USB cable uses a single set of twisted-pair cables (shown in blue) to carry data between the device and the host. A USB cable also has a power wire (shown in black) and a ground (shown in green) for providing low amounts of electrical power from the computer to USB devices. This feature is especially helpful for running low-power devices, such as a USB mouse. Devices that need more power will use an external power source or can run off a powered USB hub.

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MICROSOFT SECURITY

An email message doesn't carry the same visceral impact as a burning bush, but Bill Gates' word does have the power to create a universe of change. Past memoranda from Gates have essentially boiled down to "Let my features go forth and multiply," but on Jan. 15, 2002, a different message from Gates called "Trustworthy computing" (abridged here) went out to the chosen people of Redmond:

> Every few years I have sent out a memo talking about the highest priority for Microsoft. Two years ago, it was the kickoff of our .NET strategy. Before that, it was several memos about the importance of the Internet to our future and the ways we could make the Internet truly useful for people. Over the last year it has become clear that ensuring .NET is a platform for Trustworthy Computing is more important than any other part of our work. If we don't do this, people simply won't be willing--or able--to take advantage of all the other great work we do.
>
> [.NET] is designed from the ground up to deliver Trustworthy Computing. What I mean by this is that customers will always be able to rely on these systems to be available and to secure their information. Trustworthy Computing is computing that is as available reliable and secure as electricity, water services and telephony.
>
> Every week there are reports of newly discovered security problems in all kinds of software, from individual applications and services to Windows, Linux, Unix and other platforms. We have done a great job of having teams work around the clock to deliver security fixes for any problems that arise. Our responsiveness has been unmatched - but as an industry leader we can and must do better. . . . Eventually, our software should be so fundamentally secure that customers never even worry about it.
>
> In recent months, we've stepped up programs and services that help us create better software and increase security for our customers. We're in the process of training all our developers in the latest secure coding techniques. . . . But we need to go much further.
>
> In the past, we've made our software and services more compelling for users by adding new features and functionality, and by making our platform richly extensible. We've done a terrific job at that, but all those great features won't matter unless customers trust our software. So now, when we face a choice between adding features and resolving security issues, we need to choose security.

Read between the lines: Microsoft's fate hinges on convincing everyone from the Fortune 500 to Aunt Flora that they need Web-based services. But without public confidence that Microsoft's products and platforms are secure, this grand plan will fail.

But was Gates' memo merely a planned PR move? Can Microsoft truly realign after a two-decade tradition of promoting ever-expanding applications? How much of the security problem actually belongs at Microsoft's feet? And ultimately, does it really take divine intervention to create a truly secure computing platform?

IBM has shipped more than 3 million systems using an embedded chip (shown here) that's installed on the motherboard. The chip holds a user's private key. Without the key, hackers can't open your encrypted data

Defining Security

"Security is mostly a superstition. It does not exist in nature."-Helen Keller

It's unlikely any expert believes any computing platform can ever be 100% secure. Even if a system is locked tighter than Fort Knox, the elements of social engineering—people's gullibility and weaknesses—can ultimately compromise even the most secure computers. "So long as software is built by human hands," says Steve Lipner, Microsoft's director of security assurance, "it will contain some small number of flaws, some of which will result in security vulnerabilities."

According to Microsoft, security is freedom from vulnerability. There should be no code holes for crackers to infiltrate your network. Your co-worker shouldn't be able to swipe your PowerPoint project, and viruses should be turned away before reaching your system.

But these things happen—a lot. According to the 2002 CSI/FBI Computer Crime and Security Survey, 60% of the 503 respondents (representing thousands of employees) reported unauthorized use of computer systems within the last year, 85% reported a virus attack, 40% were victims of system penetrations, and 38% cited unauthorized Web site access or misuse in the prior year, up from 23% the year before. Amazingly, 89% reported using firewalls and 90% antivirus software.

Microsoft fetches a lot of the blame for today's security breaches, sometimes justifiably. After all, mixing an always-on Internet connection with an OS that features no firewall and File and Printer Sharing enabled by default seems almost criminally negligent. Conversely, Microsoft has been reasonably diligent about issuing security patches as problems arise. Microsoft has also shown a security commitment by halting nearly all product development for a month while 9,000 employees received crash courses in designing secure code.

"From a security perspective, ever since we got off the mainframe, all software has sucked," says John Pescatore, Gartner research director for Internet security. "But Microsoft sucks more. To put it in perspective, Unix was bad when Unix came out, and Windows was even worse when Windows came out. It's harder to write secure software than insecure software, but it's certainly not impossible or even that difficult."

Yes and no. Because of Microsoft's internal philosophy and duty to stockholders, its mission is to increase sales. Historically, what has driven repeat purchases of items like Windows and Office were new features. In this context, news that many consumers were purchasing second and third PCs meant that new functionality enabling easy home networking made sense. With the increased use of email, advanced scripts and multimedia tools in Outlook and Outlook Express made sense. Buyers clamored for features, not security, and Microsoft met this demand.

"There's a trade-off between usability and security," says Lipner. "Back in the 1980s, I built a government-evaluated system to be as secure as the National Security Agency knew how to build. I got it most of the way through development and evaluation, then wound up canceling it because nobody wanted to buy a system that secure. . . . If you built a system so secure that nobody uses it, then it doesn't help them do their job, much less improve security. Our challenge is to build systems that are usable, high-performance, and secure."

Microsoft's Two Wake-Up Calls

As Gates notes in his memo, security problems crop up regularly. In the past, Microsoft seemingly thought a problem over, issued a patch, and waited for the public to forget about it. Last year, though, Nimda and Code Red fell on each side of the September terrorist attacks and suddenly national security was welded to computer security in the public mind. The backlash against Microsoft for letting these pathogens take hold was so vehement that the corporate murmurings about beefing up security suddenly took top priority.

This coincided with internal problems in securing Microsoft's next-generation .NET platform. The importance of security in .NET can't be understated. Microsoft hopes the sweeping software platform will let people manage virtually every facet of their life from anywhere via online coordination. The right security leak could put the livelihood of a person or business at risk. The question is whether .NET—being founded on current, relatively insecure Windows versions—will be safe enough.

"It's very difficult to design a secure platform when you haven't started from the ground up," says Michael Rasmussen, director of research, information security at Giga Research. "What it takes is rewriting the foundations of these operating systems over time. What we're stuck with now is: Sure, we can design a secure operating system, but we're going to lose a lot of backward compatibility. It may take us 10 years to see trustworthy commercial systems. You can go with something like Trusted Solaris today . . . but you'll lose a lot of compatibility."

Following Gates' memo, the .NET Server development team pushed back the release schedule and made some serious modifications. Now, .NET server isn't due until late 2002. Meanwhile, security warnings and patches for IE, WinXP, Office, and Windows Messenger steadily accumulate.

Security The Hard(ware) Way

Despite the attention they receive, Microsoft's OSes are only one piece of a larger security problem. A complete approach begins at the first system power-up, even before the BIOS loads, and continues through the OS to third-party apps. Microsoft recognized long before Gates' memo that it couldn't provide total security across the PC, which is why it teamed with Compaq, HP, IBM, and Intel in 1999 to form the Trusted Computing Platform Alliance.

The TCPA (www.trustedpc.org) now has more than 180 member companies, all focused on designing the specs necessary to safeguard tomorrow's systems. Key to the TCPA spec is support for at least five major encryption algorithms and monitoring of the system boot process, starting with the BIOS initialization. The design entails an cryptographic security processor embedded on the motherboard, so even if the hard drive's security is compromised, an intruder still can't break into the chip and discover the encryption key that unlocks the drive's contents. Although ostensibly written for PCs, the TCPA spec can also apply to other devices.

The chip is much like the smart cards used to authenticate user identities in today's enterprises. A secure set of keys is stored on the chip and can't be accessed from anywhere outside. Any operations performed in conjunction with the keys are done without ever exposing the private codes to system memory. Conventional encryption performed solely in software is less secure because keys and certificates are left in the clear on the hard drive for prying eyes to see.

IBM has been installing such a chip in its desktop and mobile systems for nearly three years. IBM's T30 ThinkPad is the world's first fully TCPA 1.0-compliant computer.

"We enlisted some of the best ethical hackers we could find to test the platform," says IBM's Clain Anderson, program director for client security, "and so far no one has gotten through. We haven't run any public advertising using the word 'unbreakable,' but we've shipped 3 million systems with this onboard, and we know of no security breaches that involve our chip."

To understand how the chip is used, consider email-borne worms. By configuring a TCPA-based system to require biometric authentication before sending any messages through Outlook, the virus is blocked. When the pathogen tries to mail itself to those on the user's contact list, the security system requires a fingerprint before proceeding, alerting the user to the problem.

"We have slightly over a dozen events that you can control on the machine," says Anderson. "That includes system logon, digitally signing an email, encrypting and decrypting files, and so on. All of these things can be matrixed with any combination you want to apply of fingerprint readers, proximity badges, long pass phrases, or whatever you want."

Phoenix Technologies, the market leader in motherboard BIOSes, is one TCPA member that has taken a slightly

PICKING ON THE 800-POUND GORILLA

If Linux or Mac OS was the market leader instead of Windows, would Microsoft be the subject of so much security criticism? Probably not.

"Microsoft has a lot more security issues because there are a lot more people using and looking at them," says Jason Wright, Frost & Sullivan industry analyst. "But people move to other platforms because they think they don't have to pay attention to security. That's just not the case. No matter what platform you choose, if you don't pay attention to security, you're going to have a problem."

This doesn't imply that all systems are equally insecure or Microsoft isn't deserving of criticism. Unix-based Apache (www.apache.com) is the most popular Web server system but also is known for its tight security. Apache has security holes (see www.apacheweek.com/features/security-13), but its open-source nature helps users spot problem sources more quickly so the Apache Group can offer patch updates. However, open-source community participation isn't a security panacea.

"Linux, because it is open source, has a lot of eyes on it," says Symantec's Sharon Ruckman. "People are commenting on and changing the code. But you still have the problem of people keeping their systems up to date. Maybe I have a Linux distribution from two years ago, and there have been a lot of fixes implemented since then. That's the issue we see with a lot of current blended threats. Often, a lot of the main attacks that occur are known vulnerabilities that have been around for two, three, maybe five years, but people haven't updated their systems, especially on things like Solaris or Unix-type boxes."

"Linux certainly has plenty of security problems of its own," adds Gartner's John Pescatore. "But I still believe that the open-source model means that software gets more secure more quickly. . . . So if I were to look out five years from now at an open-source Linux-type model vs. a closed source, I would say the open-source model would have fewer successful attacks against it."

Pescatore believes Mac OS is a safer platform than Windows, but it's a "security through obscurity thing. Nobody attacks Mac OS because they are such a small ship."

The odds of a market reversal in desktop OSes are remote, especially if Microsoft delivers more secure software. Today, Linux and its GNU-based ilk would be the more secure option based solely on security. Tomorrow, that may change. What's likely to remain constant is that 800-pound gorillas tend to guard their turf vigilantly and sometimes ruthlessly.

"The risk to users is that closed-source vendors will pick and choose what flaws to talk about," says Mark Cox, Red Hat's senior director of engineering. "With Linux, that just won't happen. It's hard to hide flaws in open-source software. There is more than one Linux distribution out there, so competition will ensure that security fixes are dealt with in a timely and professional manner." ▲

different spin. Rather than authenticating a user's identity, Phoenix's FirstBIOS and FirstAuthority technologies authenticate a device, usually a PC. Encrypted key information is stored in the system BIOS, essentially offering an identifying token inside the machine.

Phoenix Vice President of Security Katherine Stolz says, "So say your company wants to make sure you only access the payroll software from one system. The company will use our FirstAuthority SDK and make the application device-aware. The client app will look for the device key when it loads. If the key isn't found—perhaps you're using an older system without FirstBIOS—it will go out to VeriSign and load the device key you've stored there. Now the key is verified by the payroll application and the app will run on that machine."

Phoenix is targeting PC mobos first, but the platform is fully x86 compatible, so it can also run on the new breed of PC tablets and other smart devices.

Only The Paranoid Stay Secure

Although IBM's security chip is great at guarding against worms, it does little to nothing to combat viruses (meaning self-replicating pathogens). Likewise, Microsoft's IFC (Internet Connection Firewall), bundled in WinXP, only monitors incoming traffic, not outbound traffic typical of a worm or unauthorized user.

Built-in tools often aren't enough to allow reasonable trust in a system. Sure, Microsoft is working to integrate more security features like ICF, but its hands are partly tied by its commitments to reach the broadest possible markets while still making products easy to run out of the box. This is why third-party security products will remain increasingly necessary, particularly in business settings.

"Microsoft won't be able to compete with the manageability and scalability that dedicated security products generally offer, at least not in the near future," says Frost & Sullivan Industry Analyst Jason Wright. "This means things like firewalls, VPN, content filtering, antivirus. Those can be very processor-intensive applications that take a lot of development to make them work smoothly. I mean, companies have been working for three or four years to make a VPN box that can set up in 20 minutes."

Microsoft's Lipner adds, "We want to give customers a secure platform and then, if there are specialized components like firewalls, in some cases we may offer those, and in others, they may need to go to a third party. But our priority is to get a secure base platform that people can use safely."

The two absolute essentials for any system are antivirus and firewall protection. In the antivirus space, Symantec is (deservedly) the market leader, and McAfee is a worthy second. Broadband users are frequently cautioned to use a firewall, but the same advice goes for dial-up users. Software firewalls that monitor inbound and outbound traffic include Symantec's Norton Personal Firewall and Zone Labs' ZoneAlarm Pro. Also know that home/small-office routers used to share a broadband connection also function as firewalls, with notable models from vendors like Linksys, Intel, and SMC .

Naturally, encryption is another valuable part of security. If your system isn't TCPA-compliant, consider at least getting acquainted with the encryption integrated into WinXP. For older Windows versions, try a third-party app like Stealth Encryptor or Crypto.

Tomorrow's Risks

The CSI/FBI survey shows that unauthorized use of computer systems peaked in the 2000 survey and is down 10% overall since. Conversely, although offenses by company insiders have plummeted, thanks in part no doubt to better authentication methods, outside threats, such as denial of service attacks and system penetration, are rising. This might indicate that malicious hackers are developing better, more highly

IS ALL BROWSER SECURITY CREATED EQUAL?

"What users are reporting in general," says Opera Software CEO Jon von Tetzchner, "is that Opera has fewer security problems than IE. We try to be more restrictive in general in allowing holes. We've had our share of troubles, of course, but most of those have come from trying to be IE-compatible."

von Tetzchner points to VBScript and ActiveX as two features intentionally omitted from the Opera browser. He notes such code adds an added layer of complexity onto the browser's design. Not only does this complexity open new holes for malicious hacking, but it also adds little or nothing to the program's actual usability. With that in mind, von Tetzchner says there is no inherent conflict between features and security.

"If you choose, you can do security without reducing functionality at all. We believe there is always a secure way to do things. It may be more difficult to program, but there is always a way," says von Tetzchner.

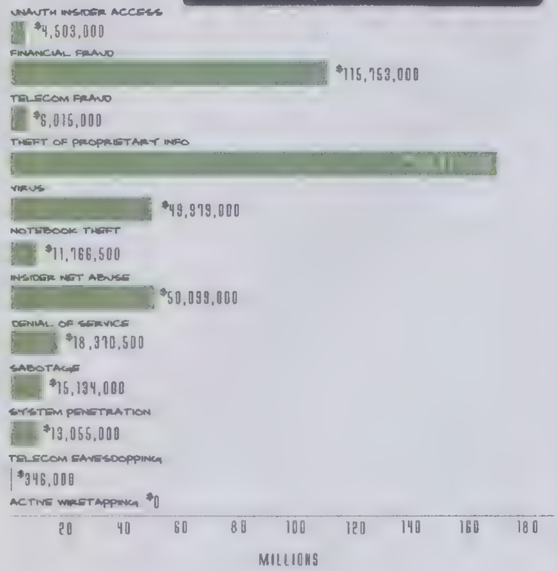
Netscape reps were unavailable to comment on its browser security vs. IE, but Netscape's browser has had its share of security woes. Recent versions have suffered from numerous JavaScript holes and SSL vulnerabilities, many of which have been patched. In 1999, integrated encryption was boosted from 56-bit to 128-bit, and today's 6.2 Netscape version sports such features as Cookie Alerts, which prompts you to approve a site's cookie only the first time it's sent, preventing an endless barrage of pop-up approval windows.

However, Netscape doesn't appear to have a security soapbox to stand on. For example, Steve Gibson of Gibson Research has detailed Netscape's dubious use of cookies in its SmartDownload app at grc.com/downloaders.htm.

IE6 does offer an impressive number of customizable security options, including lists of trusted/restricted sites and the ability to check a site's certificate status. For security, we wouldn't recommend either IE6 or Netscape 6 over the other. However, if safe browsing is a priority, give Opera a spin. ▲

DOLLAR AMOUNT LOSSES BY TYPE

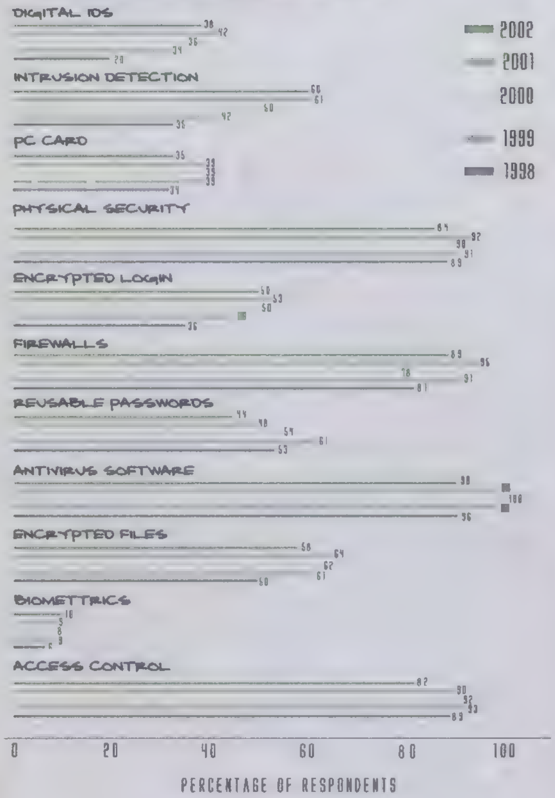
These charts from the 2002 CSI/FBI Computer and Crime Survey detail the money and measures companies are spending and taking to bolster their security.



CSI/FBI 2002 Computer Crime and Security Survey
Source: Computer Security Institute

2002: 223 respondents/44%

SECURITY TECHNOLOGIES USED



CSI 2002 Computer Crime and Security Survey
Source: Computer Security Institute

2002: 500 Respondents/99%
2001: 530 Respondents/99%
2000: 629 Respondents/97%
1999: 501 Repondents/96%
1998: 512 Respondents/98%

automated tools, which is a pattern that should continue.

As .NET grows, the OS and applications will doubtlessly grow more secure. However, some experts, including Microsoft rivals, feel the platform itself is a security threat.

"The main problem is combining the browser with the operating system and underlying technologies," says Opera Software CEO Jon von Tetzchner. "Because Microsoft has been tying these together, they have been making choices which are, in my opinion, not correct."

Sharon Ruckman, the senior director at Symantec Security Response, notes that today's blended virus threats are only a foreshadowing of what will come. In addition, the new favorite entry point into a network will be wireless devices. Wi-Fi networks are already infamously susceptible to drive-by hacking thanks to improperly configured security settings (not to mention device software that ships with open network default settings). Unfortunately, manufacturers are so anxious to release new PDAs, tablets, integrated handsets, and other next-gen wireless devices that network security is often the last priority.

"There are already about four viruses for the Palm," says Ruckman. "We've also seen some activity in Japan and Spain on cell phones. If you go over to Japan or Europe, they use their cell phones for a lot of activities, like as an infrared-equipped credit card. But if people can get into your device and find out your information, they can get back into your accounting system. They'll also ask, how can I infect the system at a server level so I can broadcast messages?"

With wider networks and more services, there are bound to be more security updates. Ultimately, this may deaden the public to security concerns.

"The biggest threat I see is that users will drown in a sea of conflicting and inaccurate security alerts and become complacent and miss the important issues," says Mark Cox, senior director of engineering at Red Hat.

The experts we interviewed agree that the security threats of tomorrow are likely to be mostly more advanced versions of today's risks. Giga's Rasmussen points out that Nimda contained five avenues of attack, any of which might penetrate its target. Tomorrow's viruses will have a broader weapons array and will mutate on the fly to thwart conventional methods of identifying and blocking virus signatures.

Today, unscrupulous companies place bounties on their rivals' notebook computers, seeking key data and access to the intranet. Tomorrow, expect the same for cell phones and even wearable computers.

Ultimately, will .NET be more secure than the Windows of today? Almost certainly. Should we trust our lives to a single computing platform? Certainly not. Microsoft can't provide total security on its own. The key to better security will be making sure that your systems are TCPA compliant, as well as getting the necessary third-party buttresses and learning to configure your equipment and applications for optimal protection. Anything less is asking for disaster. CPU

by William Van Winkle

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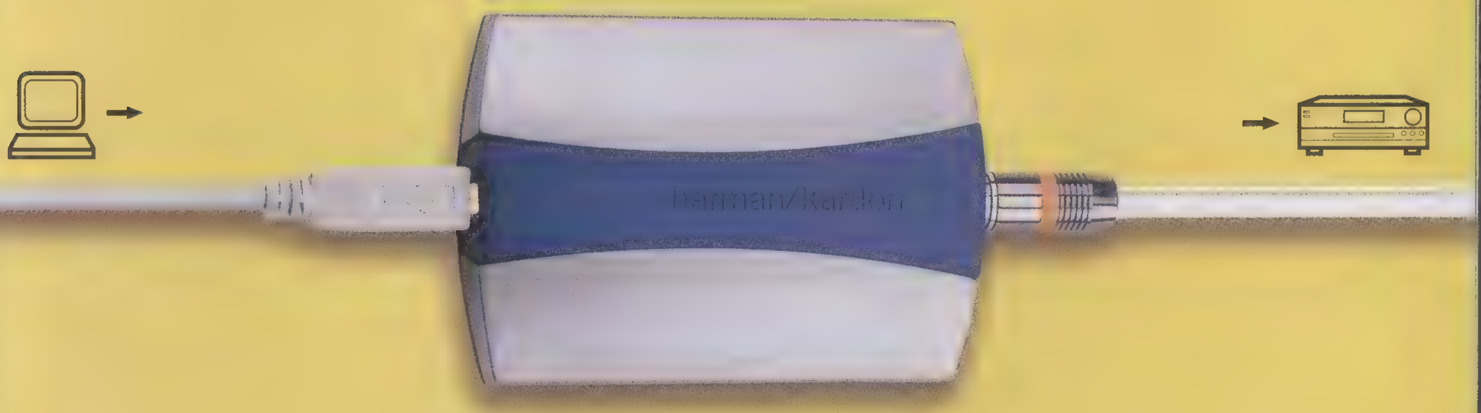

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CATCHING THE BUGS

BLACK BOX VS. WHITE BOX TESTING

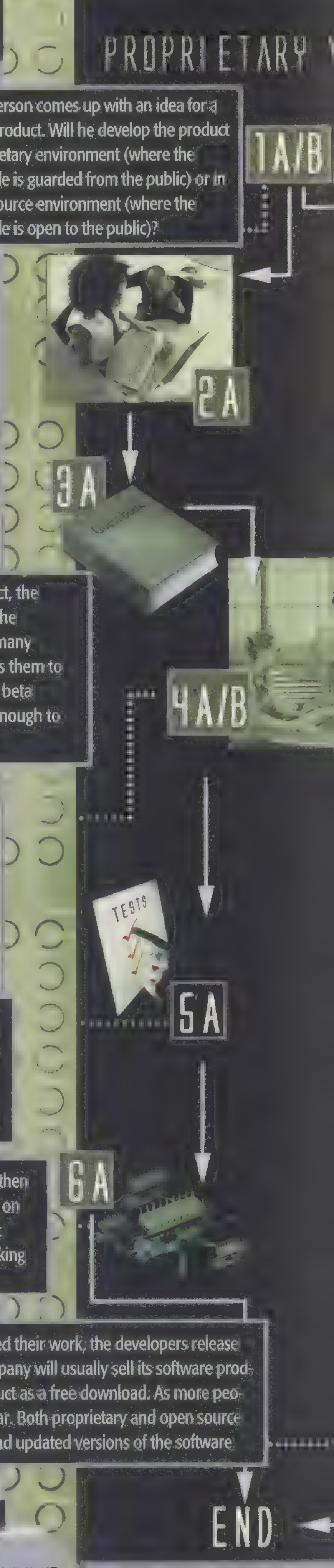
In the software development community, few debates cause tempers to flare as quickly as the argument over the merits of proprietary software design vs. open-source development. (Well, perhaps outside the debate over whether Dilbert creator Scott Adams based the pointy-haired boss character on your boss or your co-worker's boss.)

One segment of the proprietary/open-source debate involves beta testing. Although the final goal in both types of beta testing is to develop bug-free software, the two methods differ greatly. So who's right? We could fill a whole magazine with arguments for each side . . . and that's without discussing beta testing. Let's just say both methods have their pluses and minuses.

Proprietary advantages. For beta testing, proprietary software developers typically choose their beta testers. This invitation-only method ensures a certain level of expertise. For example, Microsoft, the world's largest proprietary software company, uses different types of beta testers depending on the product. An IHV (independent hardware vendor) might beta test hardware drivers, while Microsoft might invite a home-based tech enthusiast to test a cutting-edge software product.

Proprietary disadvantages. By limiting the pool of beta testers, a proprietary company could miss some bugs. And because the beta testers are recruited and invited, they might not be as enthusiastic about the project as volunteers would be.

Open-source advantages. Because beta testers can submit a variety of information, ranging from bugs to source code that improves the product, they'll probably be strongly committed to the open-source project. The open-source



1A/B. A person comes up with an idea for a software product. Will he develop the product in a proprietary environment (where the source code is guarded from the public) or in an open-source environment (where the source code is open to the public)?

2A. In a proprietary software company such as Microsoft, a team of developers will begin writing code for the new software product. They'll also probably perform some initial testing of the product, eventually developing a fairly stable beta version of the product.

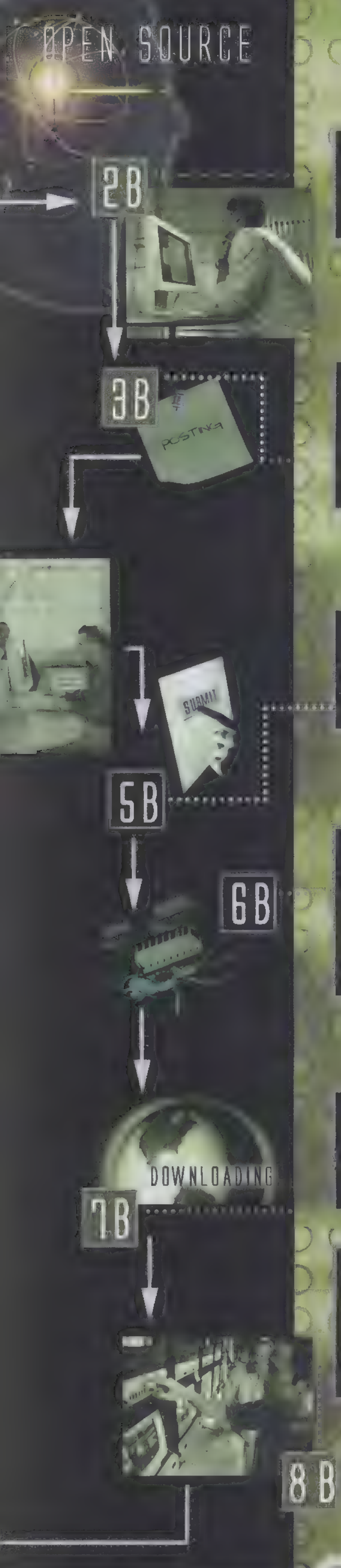
3A. To improve the chances of catching bugs in the product, the development team will compile a list of people who have the required expertise to test the beta version. Microsoft, like many proprietary companies, selects beta testers and then invites them to participate in the project. Microsoft is looking for a pool of beta testers large enough to provide useful results but limited enough to make the results manageable for the development team.

4A/B. For a proprietary software project, the users who agree to be beta testers receive the beta version of the product. For an open-source software project, the users who have seen the post about the project and are interested in being beta testers download the beta version. Some beta testers might be working on proprietary and open-source projects at the same time.

5A. Microsoft's beta testers usually follow a list of tests the development team provides. For some products, they might perform some tests on their own, as well. They then report any problems they encounter, along with a list of their computer's hardware and software setup.

6A. The developers compile and verify the list of bugs. They then rewrite the source code to correct any problems. Depending on the product and the severity of bugs found, the development team might release one or more additional beta versions, asking the beta testers to test the new version for additional bugs.

END. In both instances, once the beta testers have completed their work, the developers release the now stable (or more stable) product. A proprietary company will usually sell its software product; an open-source developer will usually release the product as a free download. As more people use the product, it's likely that additional bugs will appear. Both proprietary and open source developers will address these bugs with software patches and updated versions of the software.



2B. For a typical open-source project, a single developer will write the initial code, with the idea that others will contribute to the project as it progresses.

3B. Once the initial code is finished, the developer will usually make a post to a Web site or in a newsgroup, announcing the software and the scope of the project. He'll invite volunteers to download the software and become beta testers.

5B. An open-source beta tester might be a programmer himself, and he could write some additional code for the project, either to fix a bug or add a feature. He'll then submit his work to the original developer for consideration.

6B. Beta testers without the ability to write programming code or with less time to devote to the project can contribute by sending information about bugs or missing features to the developer. The developer might contact the beta tester for some additional information to better track down the bug.

7B. In an open-source project, new beta testers can join the project at any time just by downloading the software. They might or might not submit bugs or software patches.

8B. The developer constantly monitors the project, deciding how to fix bugs and which software patches to include in the stable version. He might recruit some of the volunteer beta testers to help him write code or to test some of the changes he has made.

beta testers have the freedom to try almost anything with the product, which can lead to better bug-finding results.

"When a proprietary company gets beta testers, they know the functionality, they go down a list, and it's good for completeness," says Jeff Bates, online director of the Open Source Development Network. "When a person can just play with [open-source software], they'll try things that never would've occurred to the developer."

Open-source disadvantages. Because open-source developers use volunteers, they may end up with a very small pool of beta testers. An open-source beta tester must find projects, whereas a proprietary developer typically will gather the necessary components for its beta testers, making it less time-consuming.

The graphic on the left walks you through the beta testing methods for Microsoft and a typical open-source beta testing procedure. The graphic shows the basic steps in both types of beta testing, but individual software developers could add or subtract some steps. (Microsoft uses different beta testing steps, depending on the product. The graphic represents the basic steps for Internet Explorer and Windows products.)

Do Your Part

If you're interested in becoming a beta tester for open-source software, try visiting www.sourceforge.net to find available beta testing projects. The site contains an automatic bug-tracking system and is good for those new to beta testing. Bates says developers appreciate all help.

"It's another piece of the puzzle," he says of the information beta testers provide. "The more data, the better. The more bug reports, the more useful."

Microsoft's beta testing is typically by invitation only. To gain a better chance of being invited to beta test, visit support.microsoft.com/default.aspx?scid=kb;EN-US;q33814 and submit the information requested. Depending on the product, Microsoft uses a variety of beta testers, ranging from beginning users to IT professionals to technology enthusiasts. CPU

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by Kyle Schurman

WHEN BLACK HOLES COME TO LIGHT

SOME OF THE MOST INFAMOUS SECURITY GAFFES

Will your PC, networks, and the Internet itself ever be fully secure from snoops and pranksters? Don't hold your breath. Sure, we have come a long way since the early days, when we viewed every floppy with suspicion. Now, virus checkers with update abilities patrol the outskirts of our systems for invaders, and most Web sites have erected substantial guards against breaches.

But as our software becomes more complex and integrated, and the Web itself becomes more a part of our desktops, the opportunities for security holes to emerge and be exploited increase. "These programmatic bugs are inherent in any complex system," says Ian Hameroff, director of antivirus solutions at Computer Associates. As we see in this brief overview of the major computer security cases of the last 20 years, every great software security hole brings with it a moment of chaos, a fix, and an important lesson for future programmers.

1980s

BOOT SECTOR BLUES

The Weak Spot: Early PC innocence. Users of the Apple II, the original IBM PC, and early Macs were all blissfully ignorant of the idea that anyone would want to damage their machines, so the boot sectors of the operating systems and boot-up routines (for the Mac) were essentially unprotected.

The Havoc: The early viruses on Apple II, PC, and Mac platforms exploited the openness of the boot routines on all of these systems. Most of the viruses were written as experiments and designed to be benign or simply pop up cute messages here and there; in some cases, however, viruses unintentionally crashed systems. The first virus found in the wild (Elk Cloner) was written for the Apple II in 1981 and was attached to the basic DOS operating system when it loaded from a floppy. The first major PC virus, called The Brain (1986), worked in a similar fashion; it altered the MS-DOS system files at a hard boot. The Mac boot routine was vulnerable because it automatically loaded into memory whatever programs were put in a special folder on the boot disk, so it was easy to slip in the MacMag virus (1988), the first recorded breach of the Mac's nonexistent security.

The Fix: Some of the earliest viruses were so rudimentary that in some cases a simple warm reboot (CTRL-ALT-DELETE) was enough to bypass the infected sectors at boot. From the mid-'80s on, most OS manufacturers began protecting system files more effectively, and eventually, motherboard BIOS makers began incorporating virus check on boot sectors. Much of the PC virus detection industry was born as a result of these first simple attacks.

Lessons Learned: Trust no one and don't swap your floppies. Early viruses such as Brain, Jerusalem, and Lehigh alerted the industry to the need for any kind of security and that an entire class of hackers and pranksters wanted to screw up your machine, simply because they could.

1988

A WORM NAMED MORRIS

The Weak Spot: Various weaknesses in early Unix Internet utilities programming, including sendmail, fingerd, and password encryption. These holes essentially let users input meta characters within one program in order to call up another on the system. "Morris exploited a feature in sendmail that was put in place for debugging purposes," says Dave Ahmad, threat analysis manager at Security Focus and the moderator of the BugTraq newsletter on security.

The Havoc: The Morris or Internet Worm of November 1988 essentially brought down more than 6,000 of the 88,000 computers then composing the Internet's precursor, ARPANet, at the same time. Written by Cornell grad student Robert Morris and supposedly intended to be benign, it attacked only DEC VAX and Sun 3 systems, but the worm itself had a bug and quickly replicated itself uncontrollably, bogging down virtually all of the subsystems on the server.

The Fix: Sendmail patches; more rigorous password encryption; more rigorous rules for sharing information among computers.

Lessons Learned: The Morris Worm alerted everyone in the industry to the vulnerability of computers in a networked world and the ways in which the Internet could be a tremendous backdoor into any connected computer. An emergency response team was formed, now called the CERT Coordination Center, for quickly disseminating news about security vulnerabilities and attacks on the network.

A VIRUS CHRONOLOGY

The Elk Cloner boot sector virus hits Apple IIs.

1981

1980–1990s

HOLE HALL OF FAME WINNER: SENDMAIL

The Weak Spot: Sendmail, the Unix utility that is responsible for transferring much of the Internet's e-mail, is "the worst piece of software ever written from a security perspective," says John Pescatore, research director for Internet security at Gartner. Hackers and even [illegible] continually [illegible] sendmail because it [illegible].

The Havoc: [illegible] sendmail has been susceptible to [illegible] hacks. The Morris Worm exploited sendmail [illegible]. Pescatore says that at one point in its long history, sendmail even let someone outside of the system gain [illegible] until [illegible] was [illegible] the [illegible].

The Fix: Upgrading [illegible]. There have been 20 to 30 versions in the past five years alone. According to Pescatore, the rate of sendmail security flaws has decreased dramatically in the last few years.

Lesson Learned: Nothing was learned because the same mistakes were made again and again," says Pescatore.

HERE'S THE PASSWORD; PASS IT ON

The Weak Spot: Microsoft's LAN Manager in Windows versions from the early to mid-1990s passed a user's password across the LAN unencrypted.

The Havoc: It was easy for hackers to find out everyone's passwords on a system.

The Fix: Post-1998 versions of Windows included very secure, highly encrypted methods for passing passwords through the system.

Lesson Learned: Encryption is necessary at all points in a system that is passing along sensitive data.

1986

Brain is the first PC virus.

1987

Lehigh and April1st corrupt Command.com on PCs, and Stoned corrupts boot sectors.

1988

The Morris worm cripples more than 6,000 computers, including one at NASA.

The MacMag virus, a virus written by the publisher of MacMag magazine, is released on a BBS system and starts infecting Hypercard.

The Jerusalem virus strikes on a Friday the 13th.

Virus hoaxes begin.

1989

Late in the year, the DataCrime virus causes hard drives to format themselves.

1990

Chameleon, Frodo, and Whale wreak havoc.

1991

Tequila and Amoeba hit boot sectors.

EARLY 1990s

YOU'VE BEEN SPOOFED

The Weak Spot: Vulnerabilities in Internet protocols that let an attacker fool a Web host into thinking that a command or message was coming from a different IP address.

The Havoc: Spoofing was a popular hacking tool because it let attackers cover their tracks by making the victim computer think it was being attacked from a different source. In some cases, spoofing let hackers implicate others falsely. The Unix shell lets two hosts authenticate and access one another without a password if the sender comes from the right host. By falsifying their source IP address, spoofers were able to trick some servers into letting them have full access to the system. In many cases, the hackers would come in and create backdoors in the system that would let them return to wreak havoc whenever they liked.

The Fix: TCP/IP has been tightened substantially as a result so the handshaking method used between two hosts is now much more difficult to crack. Dave Ahmad says that more importantly, it took the academic rose-colored glasses off of the Internet. Because much of the Web had been designed in universities to optimize the sharing of information, features such as the original TCP/IP "were built with a trusting attitude, an academic open environment attitude," he says. "Now it was realized there were hostile entities on the 'Net."

1999

OUTLOOK AND WORD: AN INSECURE PAIR

The Weak Spot: Microsoft actually regards this hole as a feature: the ability for email client Outlook to integrate with MS Word. But by programming a virus into Word and then attaching it to an email, the two programs could work together to propagate mayhem across the Web.

The Havoc: The Melissa virus of 1999 exploited this weakness famously: The virus was actually an MS Word macro that created a document and emailed itself to a person's Outlook contact list. When Melissa was posted online on March 26, 1999, it spread to individual PCs faster than anyone had ever seen an infection propagate, and in many offices, the massive outflow of email it caused brought down mail servers.

The Fix: Newer versions of Word alert users when opening a document that contains a macro, and some offices now set security on Outlook so high that it won't accept any attachments. Antivirus programmers had to change their strategy and scan both data files and executable files for viruses.

The Lessons Learned: This problem occurs in Outlook and Word because in designing the email client to integrate with Windows, and thus be more powerful than competitors' programs, Microsoft designers "were thinking of competitive advantage, not security," says Pescatore. Hameroff calls the realization of this security hold a "milestone" that caused a paradigm shift in the ways virus hunters approached their jobs. "Suddenly viruses were taking days rather than weeks to spread." Turnaround times for viral antidotes had to increase significantly.

2000

THE HUMAN SECURITY HOLE

The Weak Spot: Again, Outlook's interaction with other Windows programs let an attachment run its own Visual Basic script.

The Havoc: The Love Letter (aka I Love You) worm of May 2000 was another red-letter day for virus hunters, says Hameroff. "In less than six hours, a threat that had started in the Philippines impacted the world." This worm came as an email attachment, but unlike Melissa, it did not require Word to run. Like Melissa, it used Windows' connections to Outlook to mail itself to others in a person's contact list. Worse, it not only seriously altered files and Registry settings on PCs, but it tried to download a password-stealing program from the Web that looked for passwords on a system and mailed them to the worm's author. This love note did more than $2.6 billion in damage to PCs.

The Fix: Controversial "fixes" in Outlook made it difficult or impossible for users to open executable attachments. This security hole started an ongoing argument about how much interoperability among Windows applications is necessary. Does an email program really need to execute a Basic script?

The Lessons Learned: Because the Love Bug came in the form of an email with the irresistible subject line "I Love You," it not only exploited a technological security hole but a human one, as well: our native curiosity and desire. This "social engineering" element is one security hole programmers can't fix. As long as people are lulled by curiosity, hope, or sheer negligence into opening foreign messages on their computers, these types of viruses will continue to plague computers. "Technology cannot be used to eradicate social engineering," says Hameroff.

1992

A harmless, nameless 1KB virus becomes the first Windows infection.

The Michelangelo virus was hyped as a threat to millions of PCs when it would be activated on March 6. Only about 10,000 PCs caught that bug.

1993

Strange and Cruncher appear.

1994

Warnings about a Good Times virus turn out to be one of the first great hoaxes.

1995

The first Word macro virus, Concept, spreads quickly but is nondestructive.

The extremely damaging and complex Nostardamus appears.

1996

Win.Tentacle is the first widespread Windows 3.x infection.

Linux.Bliss is one of the first Linux viruses.

1997

For a short while, mIRC Worms were able to penetrate systems via the mIRC chat protocol.

1998

Win95.CIH proves to be one of the most pernicious viruses in history, damaging hard drives and motherboard BIOSes on half a million computers worldwide.

2001

LET'S CALL THE WHITE HOUSE

The Weak Spot: Microsoft's IIS (Internet Information Server) software, which runs many Web servers, appeared in 1996 but over time revealed a vulnerability to "buffer overflow attacks," which let an attacker issue his own commands within someone else's Web server.

The Havoc: The Code Red and Code Red II Worms of 2001 spread from 1,000 systems at 5:00 am Aug. 1 to 115,000 systems by 3:30 p.m. that day. In addition to defacing Web pages, one version ordered infected machines to contact the White House's official site in order to create a denial of service attack.

The Fix: A series of patches, but Pescatore says, "It's really not fixed yet." A beta of the next version of IIS may do the job.

The Lessons Learned: The phenomenal speed with which Code Red propagated itself alerted all security experts to the need for rapid response and worldwide viral monitoring.

WE'RE SURROUNDED

The Weak Spot: Just about everything. A new mode of worm/virus actively scanned for multiple security weaknesses on a system at once to gain entry. Anyone running Windows 9x/2000/NT/Me and connected to a network or the Web could be affected. From buffer overruns on server software to network file-sharing routines on PCs connected to the Web or a network, the latest class of security threat runs through the portfolio of possible system weaknesses in order to find an opening. These "blended threats" could even download themselves to an individual PC via a Web browser when a user visited an infected page.

The Havoc: Nimda (that's Admin spelled backward) used an email worm to propagate itself in late 2001, and it was the first worm that could actually alter a Web site so that it, too, could download infected files to users.

The Fix: A series of patches were already available for each of the holes Nimda and others exploited, but the trick of it is that all of the patches have to be in place to avoid assault.

The Lessons Learned: Eternal vigilance. Security holes are inevitable and ongoing, so the process of patching them as they are exploited must be continual. As a result of these sorts of attacks, security firms have been working on automated tools that identify and patch vulnerabilities in a system.

Ultimately, users are the biggest security hole in any computer, just as they are the surest protection. Giving unknown programs and now even documents access to your system is at least as dangerous now as it was nearly 20 years ago when we were warned about swapping those floppies. Make sure you're as vigilant as you can be so that you're part of the solution, not the problem. CPU

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by Steve Smith

2002 The Klez family of infections is poised to dominate the year in viruses.

2001 This is the year of Nimda and Sircam.

2000 Basic scripts Kakworm and Love Letter emerge.

1999 The Excel macro virus Laroux and Word 97 macro virus Ethan top Sophos' annual list of viruses most often reported to its help desk, although the Melissa virus, ranked number 7, gets all the press.

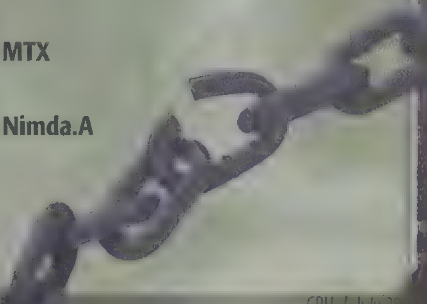
Sources: VirusList.com and Sophos Anti-Virus

Top 10 Viruses Of 2001

The security holes are still with us, and so too are the worms and viruses that exploit them. According to business software provider Computer Associates International, 90% of the top virus threats in 2001 propagated themselves mainly through email.

1 Badtrans.B
2 Sircam.137216
3 Magistr
4 Badstrans.13312
5 Magistr.B
6 Hybris.B
7 MTX
8 Nimda.A
9 VBSWG.Generic
10 Goner.A

Source: Computer Associates' eTrust Global Antivirus Research Center



PLUG THE PROBLEM

SOFTWARE FOR SYSTEM SAFETY

Some unsavory types will try to access your computer through unprotected network ports. If they get in, they'll peek at your most private files, have a field day with your passwords and credit card info, or destroy your data. What you need is some quality protection software, but you knew that already. Dragging your feet because you're not sure which products to buy? This could be the kick in the pants you need to get going.

Antivirus

Norton AntiVirus 2002 ($49.95; Symantec; www.symantec.com) performs fast, reliable scans with minimal impact on your system. NAV scans incoming and outgoing mail to prevent email Trojans from sending themselves to everyone in your address book. This feature alone can prevent many of the more virulent email Trojans and worms from becoming established. NAV also updates itself automatically as new virus definitions become available through the use of micro-definitions files. These small files let NAV perform background updates without interfering with your use of the computer. Supported platforms include Windows XP Home, XP Pro, 2000 Pro, NT Workstation, Me, and 98.

Panda Antivirus Titanium ($24.95; Panda Software; www.pandasoftware.com) features a fast scan engine that uses a small amount of your computer's resources when checking for viruses, letting you work with little or no interruption. Its SmartClean technology repairs any damage to your system files and memory that a Trojan horse or worm may have caused. Other AV software can detect and destroy these worms, but few do the file and memory cleanup for you. Supported platforms are Windows XP, 2000 Pro, NT 4.0 Workstation, Me, 98, and 95.

Firewalls

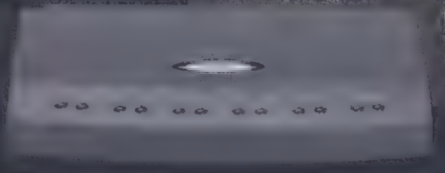
Norton Personal Firewall 2002 ($49.95 Symantec; www.symantec.com) blocks

HARDWARE TO KEEP YOUR PC SAFE

The most popular hardware-based firewall is the broadband router, also known as a gateway router or residential gateway. In addition to letting a LAN access a WAN, routers can act as firewalls by using NAT (Network Address Translation), which maps the multiple addresses on your LAN to a single address on the Internet. This provides an effective, if rudimentary, shield and can block many common forms of intrusions.

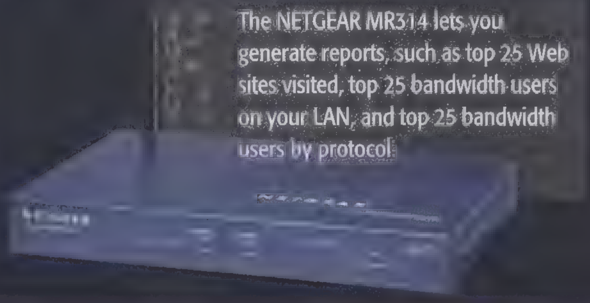
To be a true firewall, a router must provide additional security by inspecting individual data packets being sent or received. This lets routers filter data based on content, as well as filter out many forms of denial of service attacks.

SMC Networks SMC7004AWBR ($199; SMC Networks; www.smc.com) SMC's barricade line of broadband routers are effective at preventing many advanced forms of attacks, including IP spoofing, Land Attack, Ping of Death, Smurf Attack, Snork Attack, TCP SYN flooding, and datagram port loopback. You can filter local traffic bound for the Internet by IP address, type of application, or time of day. VPN support provides PPTP, Layer 2 Tunneling Protocol, and IPsec pass-through. The SMC7004AWBR also provides wireless networking support, using 802.11b protocol.



WATCHGUARD FIREBOX SOHO

The WatchGuard Firebox SOHO includes a 1-year subscription to McAfee's Web-based antivirus service, VirusScan ASaP for business



The NETGEAR MR314 lets you generate reports, such as top 25 Web sites visited, top 25 bandwidth users on your LAN, and top 25 bandwidth users by protocol.

external access to your computer and prevents programs on your computer from accessing the network. Wizards let you make basic adjustments to the preconfigured firewall settings; pros can tweak these settings for complete control. The default medium security level can prevent personal information from being sent on the Internet. Other security settings let you block ActiveX Controls or Java applets. Supported platforms are Windows XP Home, XP Pro, 2000 Pro, NT Workstation, Me, and 98.

ZoneAlarm Pro 3.0 ($49.95; Zone Labs; www.zonelabs.com) is the retail version of the ZoneAlarm personal firewall. Setup wizards walk novices through the configuration process; experts can bypass the wizards and configure the firewall directly. You can specify which programs on your PC are allowed to access the Internet, so you can disable chat and messaging programs but permit email and Web browsers. ZAP's Internet Lock feature prevents access to or from your computer via a network. And ZAP's Alert Advisor pinpoints the geographical location of an intruder attempting to access your computer. ZoneAlarm Pro works with Windows XP, 2000, NT, Me, and 98.

Encryption

BestCrypt 7.07 ($89.95; Jetico; www.jetico.sci.fi) offers multiple encryption algorithms, from simple encryption systems to powerful 256-bit systems. What sets BestCrypt apart is its ease of use. Once set up, it's almost transparent. BestCrypt uses virtual hard drives represented by standard drive letters. Data stored on one of these drives is encrypted as soon as you dismount the drive. While the drive is mounted, any application can access the data files, perceiving them as normal files on your computer. This is markedly easier than systems that require you to decrypt a file before other applications can access it. BestCrypt works with Linux and Windows XP, 2000, NT, Me, 98, and 95.

PGP Freeware 6.5.8 (free; Network Associates; www.pgp.com) can encrypt files, but its real strength is its integration with email clients, providing an easy and trouble-free way to send messages that can only be decrypted with the proper key. PGP includes plug-ins for Outlook, Outlook Express, Eudora, and Claris Emailer. Version 6.5.8 also includes PGPnet, a VPN client that enables secure peer-to-peer networking. Network Associates no longer offers the free version of PGP, but you can download it from web.mit.edu/network/pgp.html. Supported platforms include Macintosh and Windows 2000, NT, 98, and 95.

Rest Easy

Combining AV software with a hardware-based firewall will let you sleep nights. Add a software-based firewall system with improved logging and reporting capabilities, and you may be able to ruin an intruder's day by pinpointing who and where he is.

---

by Tom Nelson and Mary O'Connor

The SMC7004AWBR supports 128-bit data encryption to ensure your data remains private during the wireless portion of the transmission. You can also hide the wireless network's name, limiting access to users who know its name. This broadband router is compatible with PCs and Macs.

NETGEAR MR314 ($248; NETGEAR; www.netgear.com) NETGEAR packs a lot of snazzy features into its MR314 router, including a 4-port switch for connecting to your local workstations and an automatic uplink function that lets you connect the MR314 to a hub or switch to expand the number of computers that can be connected without using special crossover cables. Filtering includes the standard ability to enable and disable ports and protocols. It also extends to Web content.

You can configure the router to refuse access to URLs that contain words or phrases from a keyword list or add entire domains to a Trusted or Forbidden list. The MR314 also provides exceptional logging and report functions. You can configure the router to email logs at given intervals or when the log is full. VPN connections are supported for IPsec and PPTP pass-through. Finally, the MR314 supports wireless connections using the 802.11b protocol, with 128-bit encryption for security.

2Wire HomePortal 100W ($399; 2Wire; www.2wire.com) The HomePortal plugs into a phone jack; any computer plugged into one of your home phone jacks is automatically connected. The HomePortal also supports Ethernet, USB, and 802.11b wireless connections.

The HomePortal 100W supports advanced packet inspection, letting you not only choose which, if any, communication ports are open, but also what type of traffic is allowed to access these ports. This capability, known as ALG (Application Level Gateway), is a handy tool for allowing computers on your LAN to use specific services.

2Wire also created preconfigured templates for setting up ports for specific common services, such as NetMeeting. VPNs are supported, using IPsec, PPTP, or L2TP protocols. Additionally, the HomePortal can protect you against denial of service and distributed denial of service attacks. If you don't want the wireless connection and need to save some money, try the HomePortal 100 for $199.99.

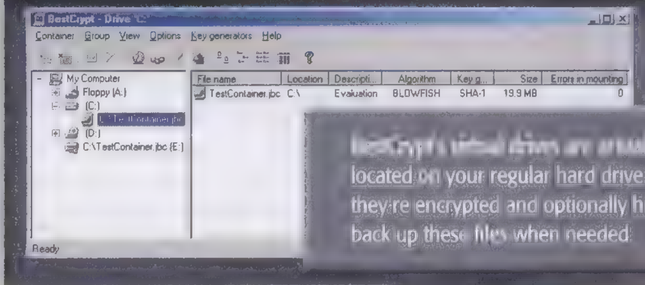
WatchGuard Firebox SOHO ($449; WatchGuard Technologies; www.watchguard.com) The Firebox SOHO is a standout product for some unlikely reasons, one of which you wouldn't normally associate with security issues: firmware updating. All of the products we've mentioned make provisions for updates, but the Firebox SOHO is the only one that does it easily.

WINDOWS UPDATES PATCHES

So you've purchased every possible product to keep your system safe. Nice move, but you'll also want to make sure your operating system, browser, email client, and other applications are current so you can benefit from security fixes. Because the Windows environment encourages the sharing of data and functionality between applications, it's possible for a security issue in one application (Microsoft Office, for example) to have widespread implications in other, nonrelated services.

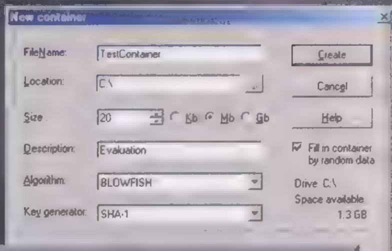
Microsoft's library of patches and updates should have what you need to plug these holes and strengthen your sense of security. You should be able to find what you need at Microsoft's Knowledge Base (www.support.microsoft.com) and Windows Update (windowsupdate.microsoft.com) sites. WinMe, 98, XP, and 2000 users have easy access to Windows updates through the Start menu. Click Windows Update, and IE will automatically connect you to the update site for your OS. Updates, patches, and service packs are categorized as Critical or Recommended; you can also select Picks of the Month and Additional Windows Features.

For update information about specific patches that will help secure your Win98/Me/XP systems, see www.smartcomputing.com/cpumag/jul02/patches. ▲


BestCrypt - Drive 'C:'
Container Group View Options Key generators Help
My Computer
Floppy (A:)
(C:)
(D:)
C:\TestContainer.jbc (E:)
Ready

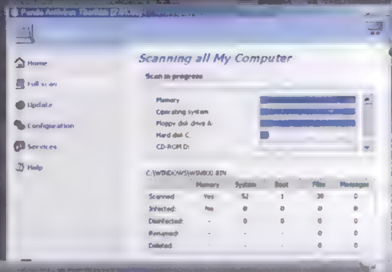
File name	Location	Descripti...	Algorithm	Key g...	Size	Errors in mounting
TestContainer.jbc	C:\	Evaluation	BLOWFISH	SHA-1	19.9 MB	0

BestCrypt's virtual drives are actually container files located on your regular hard drive. Although they're encrypted and optionally hidden, you can back up these files when needed.



FileName: TestContainer
Location: C:\
Size: 20 Mb
Description: Evaluation
Algorithm: BLOWFISH
Key generator: SHA-1
☑ Fill in container by random data
Drive C:\
Space available 1.3 GB

BestCrypt lets you set the size, type of encryption algorithm, and drive letter to be used for its virtual hard drives.



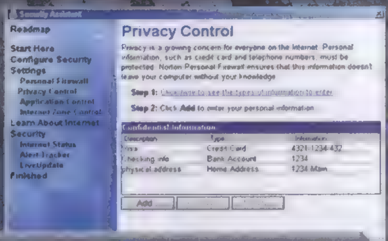
Scanning all My Computer

Scan in progress

Memory
Operating system
Floppy disk drive A:
Hard disk C:
CD-ROM D:

	Memory	System	Boot	Files	Messages
Scanned:	Yes	52	1	30	0
Infected:	No	0	0	0	0
Disinfected:	-	0	0	0	0
Renamed:	-	-	-	0	0
Deleted:	-	-	-	0	0

Panda keeps you in the know on its status as it scans your computer.



Privacy Control

Privacy is a growing concern for everyone on the Internet. Personal information, such as credit card and telephone numbers, must be protected. Norton Personal Firewall ensures that this information doesn't leave your computer without your knowledge.

Step 1: Click here to see the types of information to enter

Step 2: Click Add to enter your personal information

Confidential Information

Description	Type	Information
Visa	Credit Card	4321-1234-432
Checking info	Bank Account	1234
physical address	Home Address	1234 Main

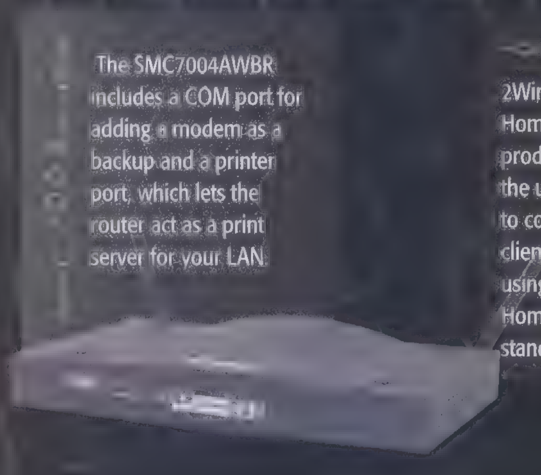
Add information to a Confidential list, and Norton will refuse to allow any data containing this information to be sent from your computer.

If an upgrade is available, a notice will appear when you log onto the router's Administration page. To upgrade, just click the link.

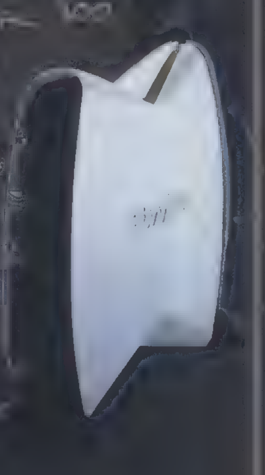
When you register the product, you activate the LiveSecurity feature. You'll receive notification of any updates to the Firebox SOHO router, as well as virus alerts, threat warnings (detailed information on security vulnerabilities), and tips on using WatchGuard products. You'll have to subscribe annually to the LiveSecurity service; a full year is included with all WatchGuard products.

The Firebox SOHO also packs its own internal filtering capabilities, including advanced packet filtering. Traffic is scanned to learn the source and destination ports and addresses. IP headers are examined to determine what computer is sending the data and what type of data should come next. Filters are then created to accept or deny the traffic, depending on what normal traffic patterns would look like. This is extremely effective at preventing denial of service attacks.

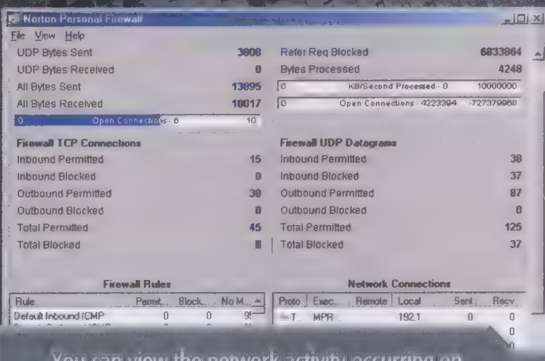
Firebox SOHO supports VPNs using IPsec tunnel routing with 168-bit encryption. Firebox SOHO also supports Authentication Headers and Encapsulated Security Payload to further enhance the security of a VPN connection. Web content filtering is available as an option, using a database provided by CyberPatrol. ▲



The SMC7004AWBR includes a COM port for adding a modem as a backup and a printer port, which lets the router act as a print server for your LAN.



2Wire's series of HomePortal 100 products offers the unique ability to connect to client computers using the HomePNA phone standard.



```
UDP Bytes Sent                 3808    Refer Req Blocked            6833864
UDP Bytes Received                0    Bytes Processed                 4248
All Bytes Sent                13895    0   KB/Second Processed - 0  10000000
All Bytes Received            10017    0   Open Connections - 4223394  -727379868
0      Open Connections - 6      10

Firewall TCP Connections               Firewall UDP Datagrams
Inbound Permitted                15    Inbound Permitted                 38
Inbound Blocked                   0    Inbound Blocked                   37
Outbound Permitted               30    Outbound Permitted                87
Outbound Blocked                  0    Outbound Blocked                   0
Total Permitted                  45    Total Permitted                  125
Total Blocked                          Total Blocked                     37

Rule                  Permit... Block... No M...   Proto  Exec...  Remote  Local   Sent  Recv
Default Inbound ICMP      0        0       9       T...   MPR              192.1.    0     0
```

You can view the network activity occurring on your computer in real-time.

Introducing the new Palm™ m500 handheld. Inside its sleek little chassis, we've added an expansion slot so you can turn it into the ultimate photo album or eBook. The optional SD cards also let you back up or increase memory, or even access worldwide travel guides. As for included applications, you can download email, import and update Excel spreadsheets, even customize and manage web content with the MyPalm™ portal. We also included mobile connectivity software—add a modem or compatible mobile phone and your information can be accessed wirelessly. It's time to mobilize.

palm

Simply Palm™
palm.com

64MB
SD Card
palm
AOL
Card Info
PhotoSuite
Date Book
AvantGo
MultiMail
Address
Security
Documents
PalmReader
HotSync
Welcome
All
the last thing you bought
this expandable
had an elastic waist.

palm powered

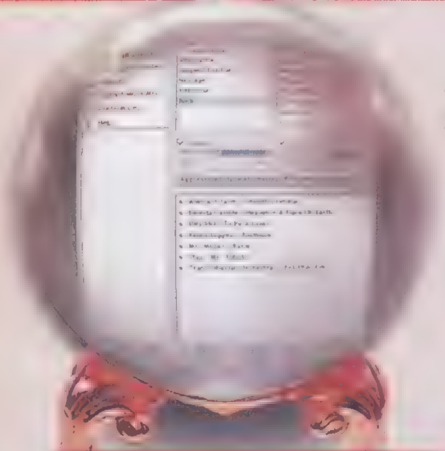
Available at: Best Buy Circuit City CompUSA Office Depot OfficeMax Staples

SD expansion cards are sold separately and not included with handheld. SD card shown is an example of available storage capacity. Storage capacity may vary. The m500 handheld requires an Internet account, modem or data-enabled mobile phone and/or third-party software for email and Internet access, sold separately. Screen image is simulated. © 2001 Palm, Inc. All rights reserved. Palm, Simply Palm, MyPalm, Palm Powered, the Palm Powered logo and the Palm logo are trademarks of Palm, Inc. or its subsidiaries. Other products and brand names may be trademarks of their respective owners.

The Bleeding Edge Of Software

by Warren Ernst

Inside The World Of Betas



Fortune-telling becomes an exact science when it comes to working with betas. This month we bring you five glimpses into the future of software.

MoodLogic 2.0 Beta

When you pop an audio CD into your PC, chances are your audio player knows the album's name, artist, and song titles, even though this information may not be on the disc. This typically is thanks to the CDDB online database. For example, a CD player might access the database looking for a CD with 10 tracks, the first at 5:12, the second 3:15, and so on, until it finds a match.

MoodLogic does much the same for MP3s. It scans your drive for MP3s, matching the length, ID3 tags, filenames, and other information to its database, which includes song categories for tempo, mood, and song age. MoodLogic combines this information with data the disc probably has, such as artist, title, album, and genre. MoodLogic then combines the information into an elegant interface that looks like something from the Mac OS X desktop.

Let's say you have thousands of MP3s, but you want to hear only upbeat '70s gospel tunes. Just adjust MoodLogic's slider to Upbeat, move the Time sliders between 1970 and 1980, and set the Genre to Gospel. The app filters your library for matches. With a few clicks, you can insert songs to your player as a playlist or save a list in MoodLogic.

The downsides include the beta only working with 25 songs until you register it for $30. Also, the app doesn't work with Win95, WinNT, Mac OS (yet), or Linux (yet), and you can't transfer a filtered song list to a portable player or even to another hard drive directory. Despite this, the beta is a potential killer worth checking out. ▲

Official product name: MoodLogic
Version # previewed: 2.0 Beta
Publisher: MoodLogic
Developer and URL: MoodLogic, www.moodlogic.net
ETA: Q3 2002
Why you should care: Managing a huge MP3 library doesn't get any slicker.

Search Toolbar Beta

For some users, Internet Explorer only has a few things going for it: It's free, it's the standard for rendering Web pages, and it launches and prints reasonably fast. Compared to Opera, Mozilla, NeoPlanet, and even Netscape, however, IE can feel light in the feature department.

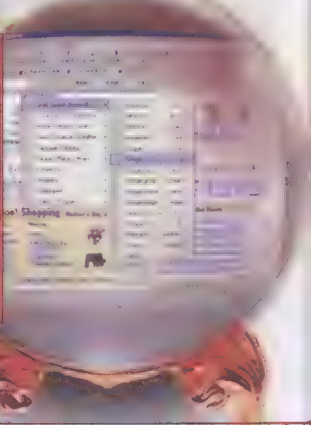
Search Toolbar addresses this, and once the beta bugs are gone, you'll probably want it. The wide range of features includes a wildly flexible and comprehensive search bar, an automatic form filler, a pop-up windows stopper, an email checker, a Winamp controller, and a small launch bar. ST does this without robbing a ton of on-screen real estate or system resources.

The toolbar is probably the biggest draw. There are the expected search engines but also direct links to News, Movies, Television, Shopping, and other categories. Just type a search term in the Search field and navigate to the engine you want. This doesn't sound like a big deal, and if there weren't so many search engines, you'd probably be right. But the breadth of search engines and Web sites is so vast you'll find yourself using it for eBay, Price Watch, dictionaries, encyclopedias, and more.

Other features are handy when (or if) they work. The pop-up stopper works most of the time, but you can't configure what it does and doesn't stop. The Winamp controller works beautifully, but you're out of luck if you don't use Winamp. The email checker only works sporadically, and the auto-fill feature lets you enter information you probably shouldn't, such as credit card and Social Security numbers.

These bugs should be squashed as the app matures. ▲

Official product name: Search Toolbar
Version # previewed: 1.0 beta
Publisher: The Search Toolbar Team
Developer and URL: The Search Toolbar Team, www.searchtoolbar.com
ETA: Q3 2002
Why you should care: Internet Explorer needs all the help it can get with features.



WinZip Command Line Add-On V1.1 Beta

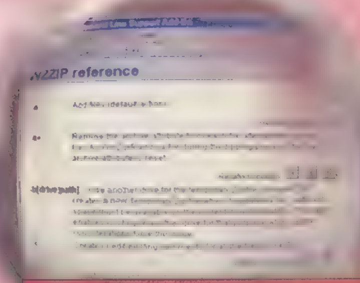
You know someone has been using computers a long time when he knows what pkzip –es –V *.* c:\file.zip means. We generally take Zip files for granted these days, but there was a time when creating Zip files meant knowing an alphabet soup of command line options. Good riddance to that, right?

Actually, there was a good reason for the command line option; it made creating shortcuts and batch files to automate processes a snap. You can still use the DOS version of PKZIP (still available), but you're likely to face extremely large Zip files, compressing tons of files, and working with long filenames with various characters.

Fortunately, WinZip finally has a command line module that does nearly everything the old PKZIP did, but without PKZIP's limitations. To get it, look at the new Beta 1.1 version instead of the current 1.0 released version. The 1.0 version was good enough to make sure the concept of a command line utility in Windows worked, but 1.1 Beta brings the needed features to the Desktop.

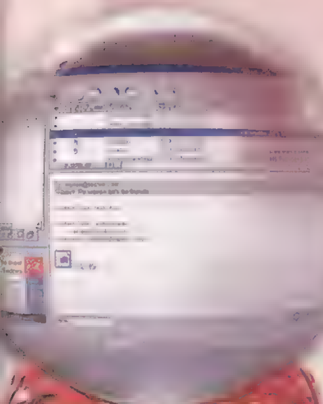
For example, suppose you want to compress a folder with subfolders and files (some that are hidden and system files) into a set of Zip files, each no larger than 650MB, to burn multiple CDs. This is a classic backup scenario that the Command Line Add-On can handle, either with two Desktop shortcuts or a single batch file. If you need to create a simple backup procedure for someone who doesn't know how to use WinZip, or you just want to automate the backup process, this is the way.

Other than a nag screen, the module was extremely polished and worked flawlessly. It's definitely something to check out. ▲



Official product name: WinZip Command Line Support Add-On
Version # previewed: Beta Release 1.1
Publisher: WinZip Computing
Developer and URL: WinZip Computing; www.winzip.com
ETA: Q2 2002
Why you should care: Though a bit tricky at first, the command line interface for compressing files is sometimes necessary for automation.

Eudora 5.1.1b3



Official product name: Eudora
Version # previewed: 5.1.1b3
Publisher: QUALCOMM
Developer and URL: QUALCOMM www.eudora.com
ETA: Q2 2002
Why you should care: The classic emailer just gets better and better.

For a look at Macromedia Fireworks MX 6.0 Preview Release 1, check out www.smartcomputing.com/cpumag/jul02/bleedingedge

Those who have moved to other emailers will find something oddly familiar with this latest beta version of Eudora, and new users may be pleasantly surprised there's a comprehensive email solution that isn't from Microsoft or Netscape. Either way, the latest version brings a lot to the table.

Eudora has three operating modes, including a Paid mode you must register that has seemingly every advanced feature and bell and whistle enabled. If you want all the features but don't want to pay for them, there's a Sponsored mode that has a never-ending stream of banner ads in the window's corner. If you don't use all of Eudora's advanced features, the Light mode turns the ads off, and it looks and feels like the Light versions of yesteryear.

Perhaps the best thing to say about Eudora is that it isn't Outlook or Outlook Express, which means it's immune to the viruses that target the Windows Address Book and the security holes that can automatically open and execute rogue code. Eudora sensibly stores attachments in a separate folder instead of within the message store.

Overall, Eudora is a powerful tool. It offers a comprehensive set of rules and tools you won't find in Outlook Express. It also comes with a peer-to-peer filesharing feature that's great for small workgroups. It even reads your mail for "risky" language and double-checks if you want to send such language.

Though somewhat of a resource hog, Eudora proved stable in my testing. ▲

Infinite Loop

spam, and Spam

Does it seem like your inbox is overflowing with spam these days? According to Jupiter Media Metrix, the average Internet user received 571 unsolicited commercial email messages in 2001. That's expected to increase to 700 "spams" per user in 2002 and 1,400 email messages per user in 2006. Here are some other tasty spam stats:

First commercial spam: May 3rd, 1978. Digital Equipment Corporation sent a mass email to dozens of ARPANet users promoting the release of several new computers.

Increase in volume of spam from November 2001 to January 2002: 46% (Brightmail)

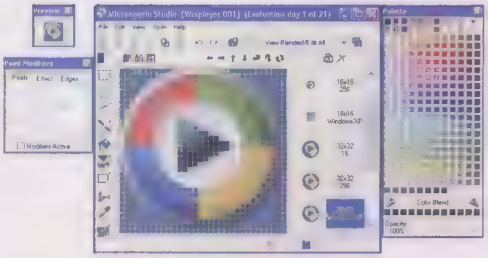
Percentage of Internet users who use a fake email address when registering at a Web site to avoid spam: 37% (Pew Internet Project)

Approximate total number of cans of Spam that have been sold since the meaty product debuted in 1937: 6 billion (Hormel Foods)

Number of Spam-branded email postcards sent each month from the Spam Web site: 1,000 (Hormel Foods)

by Kevin Savetz

Impact Software Microangelo 5.5



Microangelo 5.5
$59.99
Impact Software
www.impactsoft.com

CPU CPU CPU CPU

If you're a software developer (or just like creating art on a very tiny canvas), you need to edit icons. Microangelo is a set of utilities for extracting, editing, and cataloging icons and cursors.

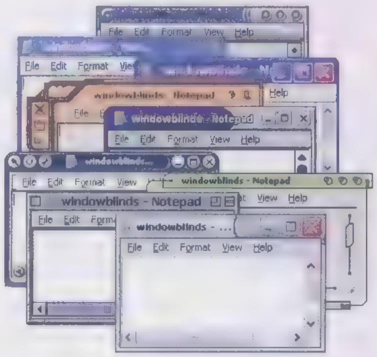
Microangelo's Studio app is a graphics editor for static icons and cursors that includes the usual line- and shape-drawing tools, brushes, and fill functions, plus other helpful tools for icon manipulation. The app's color locator helps quickly find all the pixels of a particular color in your nascent artwork, and the nudge arrows scoot icons around its tiny canvas. The Animator utility lets you create animated icons and cursors, and it sports a nearly identical interface to the Studio utility, which keeps the learning curve shallow.

If you lack the artistic ability to create icons from scratch, liberate them from other programs with the Explorer utility. Just point Explorer to any app or library and it will display the icons and cursors within it. From there, the editor is a click away. Impact Software's Web site also offers free icons, cursors, and Desktop themes for download or to import into your programs. Use them with care, as some, such as the Sesame Street and NFL football icons, look to be trademark-infringement lawsuits waiting to happen.

You don't have to be an icon artist or developer to appreciate On Display, which lets you change the default icons Windows uses for folders, apps, and common files. Customization tools let you put animated icons on the Desktop, hide or display the arrows on shortcut icons, and change the font and color of text that appears beneath icons. On Display is available as a standalone app (sans the icon-editing suite) for $19.95.

Microangelo works with any system running Win9x to XP. Version 5.5 adds support for XP icons, including icons with transparency, anti-aliasing, and drop shadows.

Stardock WindowBlinds 3.3



WindowBlinds 3.3
$19.95
Stardock
www.windowblinds.net

CPU CPU CPU CPU C

Your PC is supposed to be personal, so why is its interface more or less identical to other PCs on the planet? WindowBlinds, a component of Stardock's Object Desktop suite, is a shareware program that gives Windows a fully skinnable user interface. (In case you missed the phenomenon, skins are swappable interfaces that change the look of an application.) When installed, your entire interface—Windows and all your applications—take on a new look.

There are more than 1,500 skins from which to choose. You can explore the selection and download skins from wincustomize.com. Themes include holidays, movies, nature, and television shows. Essentially, there's a theme for every style, from the elegant to the gauche. You can even install a skin that makes your PC's interface resemble another OS, such as BeOS or Mac OS.

Installing a new theme from the Web is a no-fuss process that takes just seconds; just use your browser to download a theme and activate it in WindowBlinds. You can specify different skins for different applications, thus using several themes at a time.

WinXP offers its own skin functions, but these only work with applications made to support them. WindowBlinds' effects work with most any application, even older apps that aren't theme-aware. The effects work with Win98/Me/NT/2000/XP.

Although some system-wide modifications can wreak havoc with other programs on your system, WindowBlinds played nicely with all the applications I tried it with. If there's a problem, you can deactivate it for certain apps. WindowBlinds isn't compatible with (and is automatically deactivated for) a small handful of applications, including ICQ and Adobe Illustrator.

Overall, the program does a thorough job of overhauling a PC's interface, and although WindowBlinds isn't necessarily useful, it is fun and easy to use, not to mention a great way to make your PC a lot more personal.

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by David Braue

Executive Software Diskeeper 7.0

Diskeeper 7.0 brings several interesting and unique features to the table of NTFS and FAT (16 and 32) disk defragmenters. Whether it's superior (and worth the extra expense) to the competition, or even the defrag app that comes with your OS, however, is debatable.

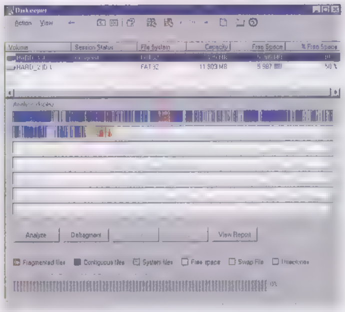
Feature-wise, Diskeeper is unparalleled. It can defragment NTFS and FAT partitions in the background, and it's much faster than Norton Speed Disk or a built-in utility. Diskeeper can also automatically monitor disk fragmentation and perform a defrag only when deemed necessary or at timed intervals you choose.

A network version of the app supports remote defragmenting over a LAN. On WinNT/2000/XP, the app knows enough to not try to optimize system files without rebooting and doing the job before the Windows kernel loads. The feature list goes on, and it's *serious.*

When it comes to measuring results, however, things get murky. On several test systems running Win98 (FAT32) and XP Home (NTFS), I measured boot and Microsoft Office load times before and after defragging with Diskeeper, a bundled system defragger, and Norton Speed Disk. Surprisingly, each reduced load times by about the same time, even though Diskeeper thought a drive defragmented with Speed Disk was highly fragged, and vice versa. Looking at each product's graphical drive maps showed approaches differ on the best way to clean up.

Things get murkier with NTFS partitions. NTFS is supposed to be resistant to fragmentation, and XP has a routine to automatically sort files by usage every three days. Diskeeper thought my well-used XP-NTFS partition was in pretty good shape, and speed improvements after defragging were minimal. A heavily used server drive would probably shape up differently.

For a nonserver environment, you should consider Diskeeper for its features instead of its overall performance.



Diskeeper 7.0
$45
Executive Software International
www.execsoft.com
CPU CPU CPU CPU

Zone Labs ZoneAlarm Pro 3.0

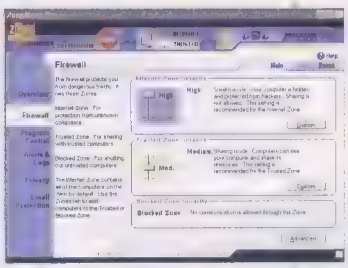
The saying goes, "two steps forward and one step back." That sums up ZoneAlarm Pro 3.0. ZAP3 adds cookie management, pop-up ad blocking, and email attachment monitoring to an industry-leading software firewall. Working with all forms of Windows from 95 to XP, this latest round of upgrades equals Norton Internet Security feature-wise. However, even though ZAP's firewall may be slightly better, a general lack of stability and overall system sluggishness makes me wonder if the upgrade is worth it.

In terms of flexibility and protection, ZAP3's firewall is top notch. It detects a LAN right off and allows network machines the degree of access you prefer. The firewall also automatically senses programs on your computer trying to access the Internet, asking you for permission. The app successfully rendered our test machines invisible to the Internet (technically stealthing the machines' IP ports), which is exactly what a firewall should do.

ZAP3's new features are indeed a welcome addition, but only when they work, and only on a reasonably modern and quick computer. With the proper horsepower, ZAP's ad blocking, cookie management, and email attachment protection work well. On a Pentium 200 machine, the slowdown and disk crunching caused some Web pages to never completely render, especially with Netscape and Opera. At times, CPU utilization reached more than 35%.

Compared to Norton Internet Security, ZAP3's extra features come up short. The attachment checker is better than no protection at all, but it's no match for NIS' bundled Norton AntiVirus. NIS can also make sure children don't type credit card and Social Security numbers online—a valuable feature ZAP lacks. Even NIS' ad blocker seems to block more.

Is ZAP3 worth the $50 over the app's free version? Yes, for the extras, provided you have a fast machine. For the firewall? Only if you run an Internet server (ZAP3 has extra configuration options). Otherwise, the free version or NIS is a better deal.



ZoneAlarm Pro 3.0
$49.95
Zone Labs
www.zonelabs.com
CPU CPU CPU CP

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Chris Pirillo

C:\Windows\SECRET \PowerTools

When he's not distributing technology tidbits and eBooks on Lockergnome.com, Chris is hosting "Call for Help" on TechTV (callforhelp.tv). When he isn't preparing for his annual tech conference (Gnomedex.com) in Des Moines, Iowa, Chris is working on developing a download site for software addicts the world over. He's also the owner of a brand-spanking new SuperDrive iMac.

Everyone knows I'm a software freak. I was downloading files to my university VMS account back in 1992, years before I purchased my first computer. Remember those days, when you knew where every file was on your system? When you had nary a kilobyte to spare? "What's this? I don't know." Delete! Those days are long gone. At least for those of us who aren't stockpiling every MP3 on the planet. I'm nowhere near a full 120GB drive. And the sad part, I haven't been keeping house as of late. Why bother? When disk space starts running low, I'll go through and remove any extraneous or redundant files. Until then, I'll keep looking for cool software. And the not-so-sad part? The coolest software is not online. It's not on KaZaA. Instead, it's probably already installed.

Want a backstage pass to the startup process?

If you're a Windows power user, you're undoubtedly running Win2000 or WinXP Pro. Anything less (in the world of Windows) is simply uncivilized. Let's assume you're running in either environment on a regular basis. Want a backstage pass to the startup process? Win2000 folks have most likely missed Win98's Msconfig tool, but WinXP users are enjoying an updated version (which will also run in Win2000). Flip to the Boot.ini tab in this utility and add a checkmark in the /SOS field. You could achieve the same result (in either OS) by tapping ESC during the boot process.

Need even more control? Look no further than the Group Policy Editor. It's Tweak UI on steroids. Press WINDOWS-R and launch Gpedit.msc from there. You can customize just about every aspect of your OS with this thing. It's a dream come true.

Now, let's say you want to create a self-extracting executable. You'd download the latest copy of your favorite archive manager, right? Wrong. You'd use the wizard already in your System32 folder. IExpress is the name of this gem; I'd be surprised if you had heard about this utility before now. In just a few clicks, you'll have created a ready-to-be-distributed archive. The ability to include a EULA document and notification dialogs is just icing on the cake.

Windows Media Player 7/8 is too resource intensive. I don't need the fancy skins, radio tuner, or digital media management features. Did you know that the old media player (6.4) is still there? Run Mplayer2 and you'll be greeted with a familiar interface. Re-associate the file types and you'll never have to deal with that beast again.

Assuming I still have the Win98 crowd's attention (I still refuse to acknowledge that WinMe was an OS), here's something for everyone with Microsoft Word 2000/2002 installed: Ever discover that your italicized 27-point Tahoma entry has suddenly turned into bold 9-point Arial? Ugh. You can't do anything about it. Or can you? ALT-SHIFT-F11 will launch the Microsoft Development Environment. It's essentially an HTML editor that'll enable you to edit the underlying XML code of your document! You can remove all the junk you don't want or need to use. And yes, you can use this to create Web pages from scratch. The Quick View tab is there for an instant preview. This is exactly what HomeSite used to be for me—only the MDE is infinitely faster. Nice, huh? If it was a snake, it would have bit ya.

Back on the Win2000/WinXP bandwagon, there's Osk.exe, an accessibility tool that's often overlooked. Is it practical? Not in every situation. If you're a slow typist, this won't increase your speed. However, if you're in a bind, you can use the On-Screen Keyboard to pass keystrokes along to an open window. I've had a keyboard failure occur at a critical moment; without this virtual input device, all would have been lost.

Can't install or run an IM client on your machine? Check out Winchat.exe. Use it to dial up someone else on your local network. In a few seconds, you'll feel just like you did in the early 90s—using the "talk" command to chat with others online. No icons. No windows. Just text.

Does Windows have anything else up its sleeve? You bet it does, and expect to hear more about what you already own (but didn't know about) in future columns. ■

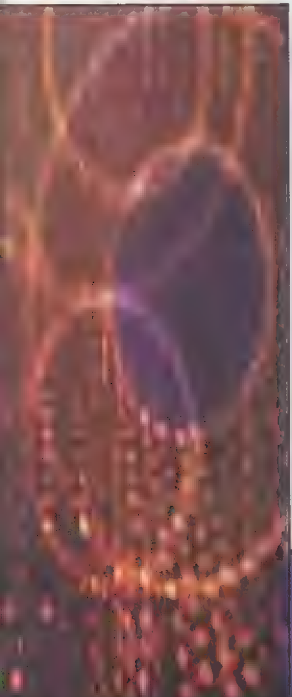
You can dialogue with Chris at chris@cpumag.com.

Open Sauce

by Pete Loshin

Linux Is Great, But I Want More

Pete Loshin, former technical editor of software reviews for BYTE Magazine (print version), writes about technology and runs the Internet-Standard.com Web site, which provides plain-language explanations about RFCs, Internet standards, and other IETF documents.



After 17 years with Microsoft, I strayed. Now, I may stray again. My two years with Linux have been good, but I need an OS that can be easy, as well as cheap. Linux may be free, but it's far from easy.

When tongues started wagging about the hot new Mac OS X four years ago, I wasn't tempted. Despite the sexy Mac look and feel wrapped around the rock solid BSD core, Macs still seemed so overpriced.

People raved about OS X. "Reliable as BSD and easy as Macintosh," they said. "Succeeds where Linux fails, putting *NIX on the desktop for the masses." Then, the prices dropped. I bought one. "It'll be fun," I told my wife. "You know, for the kids."

OS X won me over in minutes. I'd dump Linux, if only it didn't mean replacing thousands of dollars worth of Wintel equipment. If only Apple would port OS X to x86.

But the OS X core, Darwin, is based on BSD4.4, and it's open source! Maybe someone's ported it already! And so "they" have; an Apple engineer compiled the first x86 version two years ago. But Darwin offers only a BSD-ish OS that talks Macintosh file systems.

Rumors of MacOS for x86 date back to the '80s, but never has the realization of those fantasies been so close. . . .

The rich GUI goodness of OS X is in the sweet, sweet upper layers of the architecture. Aqua's on top for that signature Mac GUI; just below lie the developer frameworks. Java 2 or "Classic" compatibility layers are for running older apps, the Carbon and Cocoa frameworks are for real OS X action. Carbon lets you develop apps for current Macs (OS 8.1 and up) using traditional techniques, but Cocoa is the jewel in the crown.

Designed for OS X native apps, Cocoa provides object orientation, rapid development, and the ability to port apps from other OSes (Unix, for example) and put hot new Aqua GUIs on them, fast. Mmmmm. Aqua.

Apple just has to recompile everything and design a box before it can release OS X for x86. Aqua sits on top of the frameworks, and the frameworks talk to the data formats and OS core, Darwin. Yup, that sounds right. Oh yeah, write drivers for all the x86 hardware out there—a problem, but not insurmountable.

Rumors of MacOS for x86 date back to the '80s, but never has the realization of those fantasies been so close (www.macosrumors.com has the latest). Much as I'd love to see it happen, if only to bring some real competition to the market, it's not likely.

Apple is a doubly rara avis: (1) a software company that doesn't compete with Microsoft, and (2) a hardware company that doesn't compete with Dell, Gateway, IBM, etc. A shrinkwrap version of OS X for x86 could put Apple in everyone's crosshairs.

Linux is Microsoft's Potemkin competitor, the one to show the cadres from the SEC. Without the credibility, direction, and financing of a single firm, Linux doesn't pose a credible threat. But OS X is the real deal: a competitor with a product as good or better than Windows.

So instead of uneasy cooperation between Apple and Microsoft, expect things to get nasty. You want Office for OS XI? IE updates for Mac? "Early next year," the Microsoft product managers will tell us.

On the hardware side, Apple's proprietary tradition gives it relatively juicy margins on quality products, but OS X for x86 means Apple has to compete directly with the mass market vendors in their traditional niches: artists and education. Why spend $1,000 for one iMac or $4,000 for one Power Mac when you can buy two comparable x86 systems?

That's why I think it unlikely Apple will start selling software-only Macs. But here's why I think they might: Microsoft OS sales were roughly $3 billion for the first quarter. If Apple (with reported 2001 sales just under $5.8 billion) can bite a big enough chunk of that pie, we might find ourselves with some real OS choices at the local big box store.

I just hope Apple figures out how to break Microsoft's monopoly without ruining itself in the process. In the meantime, I'm sticking with Linux. ■

Get saucy with Pete at pete@cpumag.com.

Yeah, they actually said this . . .

Words From The Web

From an eBay message board:

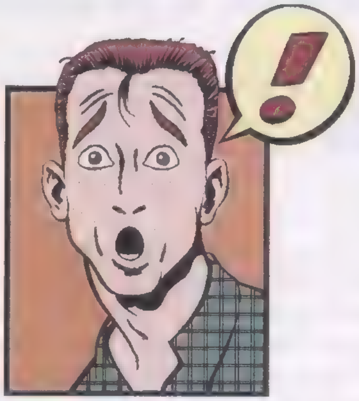
Is XP really any better than Me?

Is finding $20 better than a kick in the crotch?

From a Yahoo! gamers chat:

Dude, if your monitor is bigger than the TV, then something's screwed at your house.

You should see CPU editor Samit's place.



From a Fox.com message board:

I hate Fox network because they took off the one great show they had, and all their other shows are stupid.

Don't worry. You'll see "Celebrity Boxing" again.

From an MSN.com baseball chat room:

I hope the Cubs enjoy wine . . . because they are going to spend a lot of time in the cellar.

Maybe the Cubs are enjoying their wine during the game.

May I Borrow Your Browser?

I hate Internet ads. Big ads, small ads, pop-up ads, pop-under ads: They bother me immensely, especially the dreaded Shoshkeles: the animated ads that walk across your browser when you're trying to read the latest news on your favorite Web site. Yeah, Shoshkeles can be kind of cute, but I'm trying to read here, OK?!?

Word has it the company that inflicted Shoshkeles upon us, United Virtualities, has cooked up a new and intriguing way to slip promotional material in front of our faces: Ooqa Ooqa. Soon, Web sites will be able to use Ooqa Ooqa to place ads or graphics in a user's browser toolbar when a user visits a particular site. Granted, the slate gray toolbar is as exciting to look at as cement, but at least it leaves me alone.

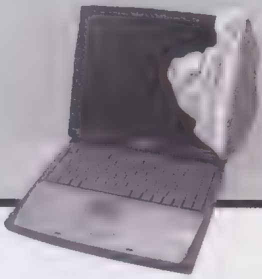
One unsettling feature of Ooqa Ooqa is that it can add or usurp existing browser buttons with its own, so a car manufacturer's site could include a button to an auto loan calculator. Some users will find these tools interesting, but I'm sure some Web sites will use Ooqa Ooqa's power for Evil rather than Good. Fortunately, users will be able to choose whether their browsers can become Ooqa-ized. I envision a pair of ruby red slippers on the toolbar that we can click to go home. ▲

Infinite Loop

Imagine Them In Their Underwear

In a survey of 2,400 notebook users, Intel found that users have powered up their notebooks in the unlikeliest places. According to the survey, 81% have used their notebooks while watching TV, 60% while in bed, 54% while eating, and 48% while naked or wearing nothing but their skivvies. Can you guess which of the following weren't listed among the unusual notebook-using circumstances Intel received?

A. To videoconference a wedding
B. While riding a ski lift
C. To end a romantic relationship
D. While milking a cow
E. While riding a horse
F. With a goat



ANSWER: IF YOU GUESSED "B" AND "F," YOU'RE RIGHT ON.

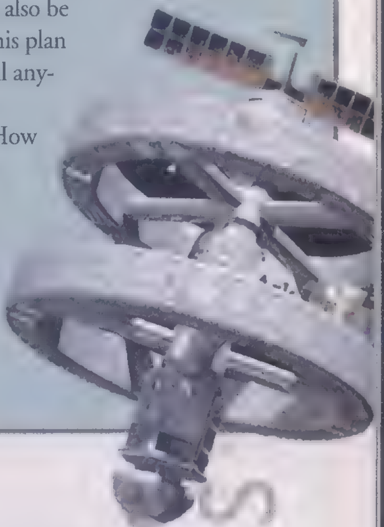
by Michael Sweet

Get On Board

So what's an innocent civilization to do when the world is suddenly scarfed down by next-generation nano-critters? Get the hell out of Dodge. Way out, in fact. The Lifeboat Foundation (lifeboat.com/ex/) is betting that future nanobots are going to treat planet Earth as their personal holiday cheese ball some day, consuming everything in sight, including you and I. The lifeboaters, or nanonots, as I like to call them, are preparing for this doomsday scenario and other technology-induced catastrophes by developing a space station to which a handful of lucky humans can escape.

The Lifeboat Foundation Web site includes several quotes from notable people, such as Warren Buffett, Carl Sagan, and Arthur C. Clarke, that supposedly refer to Lifeboat's cause, although the quotes are out of context and seem to be about technology in general, rather than the Lifeboat Foundation or the nanomunchies. The general theme of the quotes is that, in certain circumstances, technology can be a bad thing.

You can make a donation to help the cause, but that won't guarantee you a seat on the space ark. Travelers will be chosen by lottery, although the Lifeboat Foundation Web site states that trust funds for Lifeboat scholarships will also be available. I have a few questions about this plan before I pony up my donation. First, will anyone be able to actually get to the station before they're eaten alive by nanobots? How are we going to get to the station? Does Mercedes have a rocket in the works? Will there be cable TV on the station? Will there be side dishes with dinner? Who's going to take out the trash? Is Starbucks opening a store there? We're bringing Shannon Elizabeth along, too, right guys? Right?



What's In Your Name?

The computer world is up to its A.S.S. in acronyms, and online acronym generators are abundant. One of the funniest I've seen is C.Y.B.O.R.G., at brunching.com /toys/toy-cyborger.html. Enter your name into the Cyborger, and it'll break it down into a funky 'borg-like acronym. Michael turns out to be Mechanical Intelligent Construct Hardwired for Assassination and Efficient Learning, which, oddly enough, is exactly true. Susan is a Synthetic Unit Skilled in Assassination and Nullification (my kind of gal), while Marty is a Mechanical Android Responsible for Troubleshooting and Yardwork, but we already knew that.

The site has another acronym generator called the AIEEE (Acronym Interaction, Expansion, and Extrapolation Engine). Enter any two- to six-letter word, and the engine will spit out its tech-sounding acronym. A.S.S. becomes Audio Software Service and M.O.N.K.E.Y. is Modular Omni-Nano-Kernel Expansion Yield. It is important to know these things. Really. ▲

HELLO
my name is
David
D.A.V.I.D.: DIGITAL ARTIFICIAL
OLENCE AND INFILTRATION DEVICE

Organizing Principles

It's no secret that entertainment media companies are in favor of limiting a consumer's ability to copy digital media such as audio CDs and DVDs. But a handful of IT dignitaries are standing up to pushy record companies and even pushier politicians and promoting fair-rights use for consumers. DigitalConsumer.org is a consumer advocacy group that is encouraging the government to adopt a Consumer Technology Bill of Rights so you and I can continue to make MP3s of Metallica's greatest hits no matter how loudly Lars Ulrich whines about it.

Graham Spencer and Joe Kraus, the guys who founded Excite.com, created DigitalConsumer.org in 2001. The main goal of the organization is to clearly establish and protect a consumer's rights regarding the use of media that a consumer buys. DigitalConsumer.org has drawn up a proposed bill of rights, as follows:

1. The right to "time-shift" media. For example, recording a TV show and watching it later.
2. The right to "space shift" media. For example, copying a CD you have legally acquired to an MP3 player for listening at the gym.
3. The right to make backup copies of media. For example, backing up your CD in the event the original is destroyed.
4. The right to use legally acquired media on the platform of your choice. For example, watching television on your iMac or listening to music on your RIO MP3 player.
5. The right to translate legally acquired media into comparable formats.
6. The right to use technology in order to achieve the aforementioned rights.

DigitalConsumer.org encourages Internet denizens to send messages to their congressional representatives in support of the Consumer Technology Bill of Rights. In fact, the group will fax a note to your representatives on your behalf. All you have to do is go to the DigitalConsumer.org Web site (digitalconsumer.org) and fill out an online form. Meanwhile, you'd better burn your CDs now, while you still can. ▲

If you find a strange, interesting, or funny Web site in the course of your Internet travels that you think is worthy of Fringe, send your suggestion to fringe@cpumag.com

RealNetworks

Welcome To The Real World

There's a Zen metaphor that says it is better to be like the reed in the river, bending and shifting with the current, than the stone that is gradually worn away to nothingness. Most fledgling companies that create a new software business and draw Microsoft's attention aim to be the stone. The company develops a hot technology, hooks the public on using it, and proves that the business is lucrative. Then, three product generations later, Microsoft has figured out how to do that business better and promptly erodes the company down to oblivion.

When Rob Glaser graduated from Yale in 1983, he started a decade-long stint at Microsoft, eventually working his way up to the title of vice president of multimedia and consumer systems. Even at this early time, Glaser recognized the importance of the Internet and envisioned the possibilities of a company delivering full-blown multimedia news and entertainment over the Web—essentially cable TV over a phone line. Glaser, notorious for his brains, drive, and temper, left Microsoft and founded Progressive Networks in February 1994 to try and bring his media-rich vision into reality. Fourteen months later, Progressive released its first version of RealAudio and thus founded the entire streaming media phenomenon.

At the time, Glaser commented that RealAudio was a first step toward providing video-on-demand, the key ingredient in his next-generation content delivery dream. Glaser knew that feasible video streaming was still years away. A more immediate problem was the prospect of drawing Microsoft's envious eye. Glaser recognized the massive business potential behind streaming media and knew first-hand how Microsoft gravitated to any proven, lucrative software business. So he moved to make his ex-employer an ally early on.

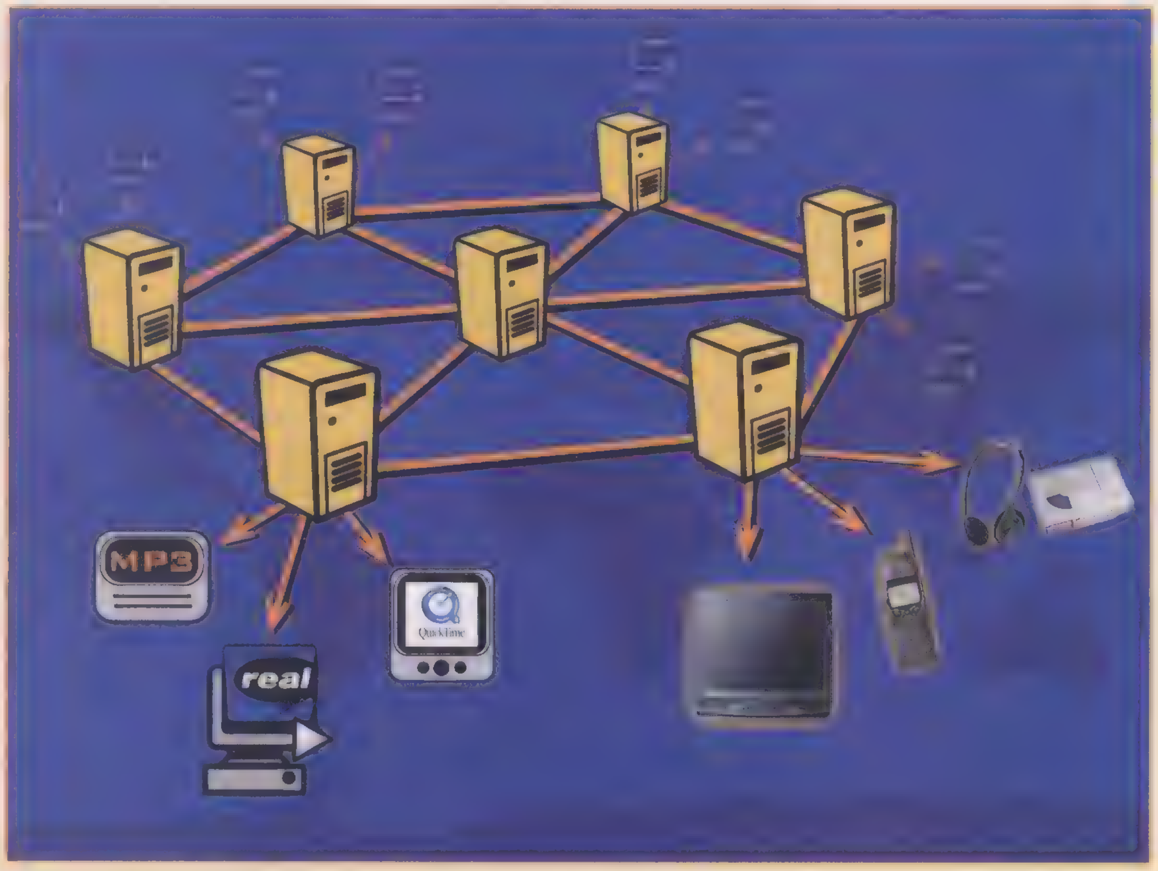
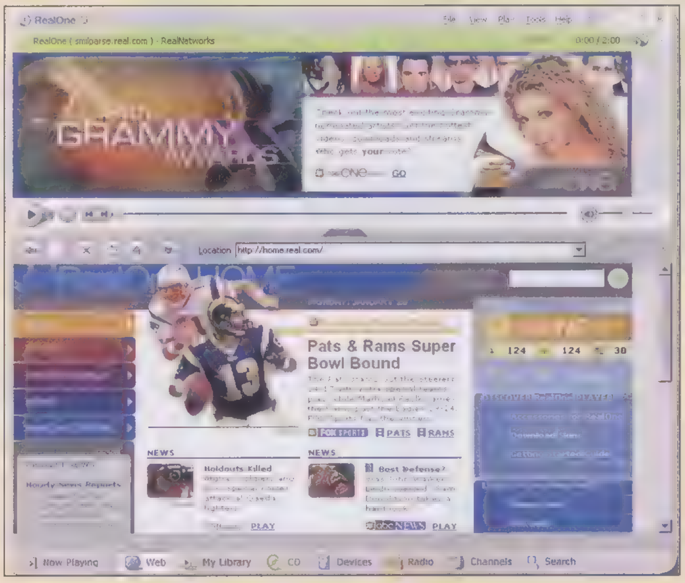


Image courtesy of RealNetworks

RealSystem iQ is RealNetworks' advanced architecture for not only balancing high demand loads across the server network but also being able to output streaming content in several formats to a wide range of display or listening devices.

In 1995, as Microsoft was hyping Internet Explorer as part of its Windows 95 rollout, RealAudio Player was the only third-party app bundled with IE, putting Real streaming into millions of hands. The following year, Progressive agreed to support Microsoft's ActiveMovie Streaming Format while Microsoft reciprocated by incorporating RealAudio directly into IE. (You can already see the two companies jockeying to see who could swipe the most concepts from the other.) In February 1997, RealVideo arrived.

Feeling increasingly like its head was resting in the crocodile's mouth, Progressive again announced a cross-promotional technology deal with Microsoft, which made a short-lived minority investment in Progressive. In September 1997, only three days before announcing the inclusion of its streaming codecs in IE4, Progressive changed its name to RealNetworks and quietly started removing its head from the croc's jaws. With the race for online media delivery now afoot in earnest, Real seized its early lead and ran like mad.



RealOne is a one-stop portal for a huge selection in online sports, news, and entertainment content. The application's convenient interface makes ripping a CD just as easy as watching the night's financial news.

Streaming Into Big Business

Glaser knew only too well that Microsoft had big plans for streaming media. The mid-'90s had provided the classic example of Netscape trying to win the browser war by relying on a reputation. By 1998, Real's technical streaming superiority was obvious, how long would it last? To survive, the company needed to bend and shift and go in a direction Microsoft either would not or could not immediately follow.

In July 1998, Real moved to establish itself as the end-to-end platform for all online multimedia with the release of RealSystem G2. G2 marked a product lineup that is still the backbone of the company's offerings today. At the top, streaming servers ran RealServer, which could support one stream or many thousands. To convert media into Real format, there was RealProducer, and for viewing there was RealPlayer, which was compatible with not only Real's own codec but a host of other industry standard formats.

To help cure the cut-outs and buffering that plagued nearly all dial-up streaming sessions, G2 also featured a new technology called SureStream. Instead of the user selecting one streaming bit rate for the entire streaming session, TrueStream actively monitored the user's available bandwidth and hopped between different bit rate versions of the content as needed. If 'Net congestion dropped the effective connection speed, TrueStream would switch to a lower bit rate.

G2 also marked the introduction of RealChannels, a group of buttons in the RealPlayer interface that launched exclusive clips from major media titans. Now consumers not only had a free audio/video player but also one-click "channels" for playing content from sources such as ABC, ESPN, FOX, Sony, and the *Wall Street Journal*. Real had turned monitors into TVs at last. Only one thing was missing: TV quality.

Streaming windows, constricted by the horrifically slow speeds of dial-up connections, yielded tiny, overpixelated images wherein human faces looked more like orange blobs, and the audio sounded constricted and tinny. Real sought to improve matters first by incorporating Intel's Web Streaming Video technology. Then Real partnered with Inktomi to assist in caching content. Rather than having all streaming content located at a single server location, Inktomi distributed the content across its international network of cache servers, distributing high demand loads across the network and allowing users to download from a nearby server and achieve faster streaming performance.

In 1995, RealAudio Player was the only third-party app bundled with IE, putting Real streaming into millions of hands.

Where streaming was starting to make more sense, though, was in enterprise settings. Training videos and executive speeches could be encoded with RealProducer then streamed out to thousands of employees across the intranet with RealServer. By staying on high-speed lines and not getting mired in the Internet's congestion, Real's platform showed its true potential.

At the same time, portals such as Broadcast.com (now owned by Yahoo!) were discovering that by making a diverse array of content available for streaming, advertisers would pay to get their messages stuck on download pages or inserted into audio streams, much like radio ads. RealNetworks took an early lead in devising broadcasting server products both for online companies and conventional TV and radio broadcasters who wanted to simulcast via their Web sites. In practically all of the online multimedia services that sprang up in anticipation of widespread broadband adoption, RealSystem was the only game in town.

For years, Real's primary business model entailed giving away the basic player, producer, and server apps, then charging for more feature-rich versions.

The key problem, of course, was that the cable companies and telcos ran out of cash, and broadband deployment hit the skids.

Laying More Groundwork

For years, Real's primary business model entailed giving away the basic player, producer, and server apps, then charging for more feature-rich versions. For example, the souped-up RealPlayer Plus G2 added video controls, such as brightness, contrast, hue, and saturation, and a 10-band graphic equalizer for fine-tuning RealAudio streams, all for $29.99. It soon became clear, though, that Microsoft could play the same game at lower prices.

In an attempt to make Real technology the backbone of consumers' music lives, the company entered the jukebox arena with RealJukebox, which helped users rip their CD collections into more space-efficient RealAudio files. Unfortunately, RealJukebox was unable to drown established players such as WinAmp and MUSICMATCH Jukebox. Moreover, the application was almost immediately dogged by allegations of privacy infringement. The original RealJukebox reported user activities back to RealNetworks. Richard M. Smith, the discoverer of this reporting, details his findings at users.rcn.com/rms2000/privacy/realjb.htm. Soon after, RealNetworks dismantled these functions in RealJukebox but then faced the same battle all over again when privacy maven Steve Gibson found that Real's download manager, RealDownload, was transmitting his name and email address back to the company. (See grc.com/downloaders.htm for details.)

A new revenue stream was needed, so Glaser returned to his original TV-via-Internet dream and released the GoldPass subscription service in August 2000. For $9.95 per month, subscribers could watch exclusive concert footage, sporting events, news programming, and more in addition to games and premium software. GoldPass faced the twin challenges of a rough economy and sparse broadband availability, but the service still managed to draw more than 400,000 subscribers.

By mid-2001, though, Real appeared to be in a technological funk. Microsoft was racking up more favorable reviews for both its audio and video codecs. Windows Media support was sweeping through third-party player apps and portable devices, while Real boasted almost no such support. The numbers surrounding Real's market penetration in this period vary depending on whom you ask. RealNetworks maintains that "greater than 85% of the streaming content on Web pages is in RealNetwork formats." The company cites Thomson Multimedia numbers from March 2002 showing Real technology on 54,000 servers and Windows Media on only 14,000. Microsoft counters that much of Real's 85% is outdated, archived material.

In any event, Microsoft didn't have SureStream or a system such as iQ, but it had inertia where it was needed most: propagating its codec. Nielsen/NetRatings numbers from November 2000 showed the number of users streaming Windows Media format growing by 20.7% over the preceding three months compared to only 2.3% for Real. It was time for RealNetworks to bend again.

There Can Be Only One

2001 provided some critical lessons for Real. First, in a turbulent market, free online radio subsidized by advertising crumbles. Nearly every major streaming radio service disappeared. The notable standouts were Spinner, which had AOL's deep pockets to prop it up, and MUSICMATCH's Radio MX, which charged a monthly fee for ad-free, CD-quality music streaming. Against this backdrop, the downfall of Napster and rampant lawsuits surrounding unmanaged music swapping drove home the necessity, of having both strong licensing deals with entertainment companies and a bulletproof digital rights management system.

During the troublesome time from 1999 to 2001, RealNetworks had not been idle. The company continued to refine its codecs, striving to create a VHS-quality experience at broadband bitrates. Real joined hands with Sony to work on distributing secure digital content by incorporating Sony's ATRAC3 compression technology. Partnerships with IBM

RealNetworks understands that the battle for multimedia supremacy may have started on the desktop, but it's likely to be decided in people's pockets.

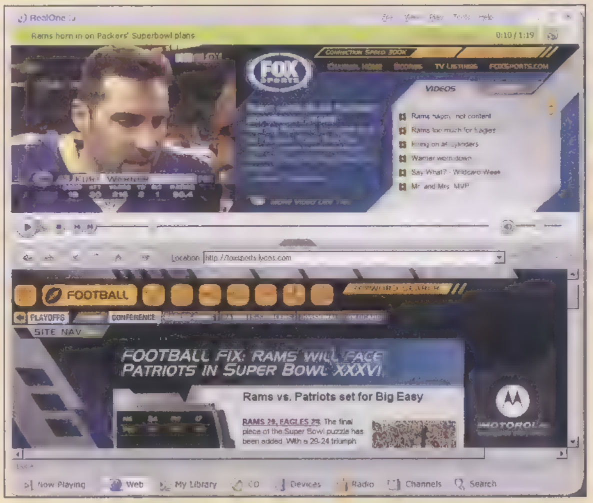
and others solidified Real's efforts to integrate ecommerce alongside its multimedia content. RealSystem iQ emerged as a far more efficient server technology for broadcasters to handle large volume traffic without getting swamped by demand—a problem seen in events such as Victoria's Secret and Madonna concert broadcasts. Perhaps most significantly, Real entered into a long-term partnership with Nokia and began integrating MPEG-4 technology, an advanced multimedia codec that plays equally well on desktops and portable devices. Most of these developments were invisible to the general public.

Many of Real's quiet advances culminated when the company announced the RealOne platform in September 2001 and officially released the software in March 2002. A combination of RealPlayer, RealJukebox, a legal music download service, and high-quality online radio and video content from name brand broadcasters, RealOne marks a major evolution from Real's old GoldPass service, which ultimately racked up more than 400,000 subscribers. Now, RealOne SuperPass offers similar but expanded premium news, sports, and entertainment content, still for $9.95 per month. For those who don't care about video, RealOne MusicPass ($9.95 per month) provides access to nearly 50 genre-based radio stations, plus the ability to stream and download as many as 200 songs per month from acts on labels including Arista, EMI, Warner, Virgin, and Zomba. RealOne SuperPass Gold ($19.95 per month) covers access to both services and bumps the music streams/downloads to 250 per month. The basic RealOne Player continues to be free, marking Real's move to the conventional give-away-the-player-and-charge-for-content model.

So far, it's too early to say if RealOne will be a success. Elsewhere in the music subscription space, MUSICMATCH's Radio MX service already shows a profit. RealOne already boasts more than 600,000 subscribers, each kicking out at least $9.95 a month, so Real's prospects look increasingly bright. The company went from losing $10 million to $20 million per quarter on paper in 2001 to posting a $1 million net income in the first quarter of 2002.

Real Today, Really Tomorrow

Last April, RealNetworks debuted its latest codec advances, RealVideo 9 and RealAudio Surround, which once again leapfrog over Microsoft. RealVideo 9 provides 30% greater bandwidth efficiency and enables VHS quality at 160Kbps, a data rate at last sustainable by the average DSL connection. Near-DVD quality streams kick in at 500Kbps. RealAudio Surround still relies on the RealAudio 8 codec but adds either 4.1 or 5.1 surround capabilities starting at bit rates as low as 44Kbps.


RealOne
File View Play Tools Help
Rams horn in on Packers' Superbowl plans
0:10 / 1:19
CONNECTION SPEED 300K
FOX SPORTS
TV LISTINGS
FOXSPORTS.COM
VIDEOS
Rams happy, not content
Rams too much for Eagles
Firing on all cylinders
Warner worn down
Say What? - Wildcard Week
Mr. and Mrs. MVP
KURT WARNER
Location
http://foxsports.lycos.com
FOOTBALL
PLAYOFFS
CONFERENCE
SITE NAV
FOOTBALL FIX: RAMS WILL FACE PATRIOTS IN SUPER BOWL XXXVI
Rams vs. Patriots set for Big Easy
MOTOROLA
Now Playing
Web
My Library
CD
Devices
Radio
Channels
Search

RAMS 29, EAGLES 24 The final piece of the Super Bowl puzzle has been added. With a 29-24 triumph

RealNetworks CEO Rob Glaser is known for his love of sports, which may explain why RealOne does such an excellent job with its sports coverage.

RealNetworks understands that the battle for multimedia supremacy may have started on the desktop, but it's likely to be decided in people's pockets. With 3G cellular networks due shortly, people will be looking for ways to make use of their wireless bandwidth and color screen-equipped handsets. Real is racing to be the first codec to dominate this space. RealOne Player Mobile recently took up position alongside Windows Media Player on Pocket PCs. Currently, RealPlayer is the only media player slated for all next-generation Nokia smart phones. (Even though today's 2G networks only manage 14Kbps or so of bandwidth, this is still sufficient for streaming RealAudio, which got its start on 14.4Kbps dial-up modems.) Most recently, RealNetworks and Sony announced an agreement to expand the melding of RealPlayer and RealJukebox with Sony's ATRAC3 compression and OpenMG copy protection system, so expect to find Real software popping up on a lot of Sony consumer electronics and computing devices in the near future.

By the end of 2002, you should see Real technology built into TiVo set-top boxes, Symbian handsets, Sony's PlayStation 2, and much more. RealNetworks has more than $360 million in cash, a brilliant CEO, and the ability to keep bending in the river as needs demand. The company has proven it can invent, innovate, compete, and transform. We've seen Real rule the world of desktop streaming. Now is when we see if the company can achieve similar greatness beyond the PC. CPU

by William Van Winkle

Coder's Corner: XML

Programming & XML, Part 1:
The XML Parser

In Coder's Corner: XML, Ian Graham shows you how to program with XML. Ian is the author of numerous books pertaining to Web development, including "The HTML Sourcebook" and "The XML Specification Guide."

In June's installment of "Coder's Corner: XML," we looked at using DTDs (Document Type Definitions) to define reusable "entities" that you can use in a document or to define rules for using specific XML elements inside a particular type of document. That knowledge, plus what we've previously learned about XML syntax and namespaces, provides the basics for understanding XML.

However, to really make XML useful, you need to hook XML data into a program or application. Thus, this month we'll look at how software reads in and processes XML and makes the data available to an application, such as a Web browser or editor.

Parse It Out

The software that reads in XML and makes the data available to an application is an XML parser. XML parsers understand all the XML syntax rules, as well as those of a DTD. A parser checks a document for correctness and, if the document is acceptable, makes the data—defined by the element tags and nestings, attribute names and values, and text inside the elements—available to the overall program. Parsers do so using a parser API (application programming interface). Applications use an API to access the data.

If there is something badly wrong with the XML data (such as two elements not properly nested), the XML parser stops reading the XML and reports an error to the application. XML specifications carefully define XML errors and explicitly state when an XML parser must report an error and stop.

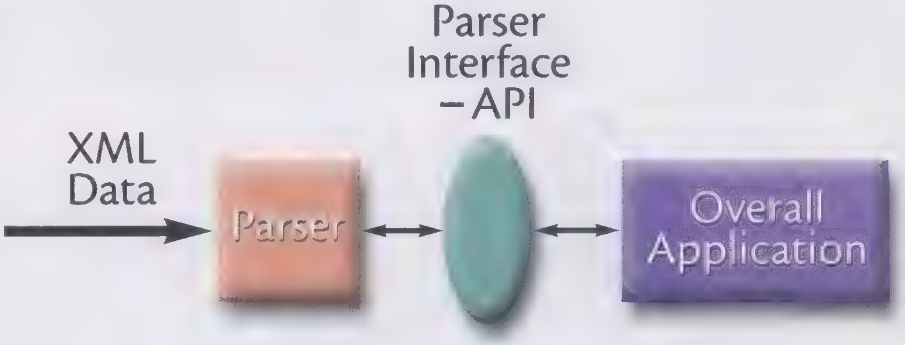
Someone writing an XML-based app typically doesn't care how the parser works. They simply want to write code that connects the app to the parser to access the data or discover there's something wrong with it. Such a developer cares only about the parser's connection to the application, namely the API.

In principle, there can be as many APIs as parsers, with each parser developer creating his own interface. However, this isn't convenient to someone wanting to use a parser (who would have to learn a new API for each parser) or to a parser author (who would have to figure out a good API design). XML architects recognized this early on and settled on a few generic APIs to cover the most common ways programmers use XML. As a result, programs written for one parser are generally portable to others. The parser may change, but the interface largely doesn't.

"Generic" also implies that the APIs are the same for essentially all programming languages. This means the program calling the parser doesn't need to be written in the same language as the parser. For example, Microsoft distributes an XML parser called MSXML (http://msdn.microsoft.com/xml) you can access using Visual Basic, JavaScript, C++, or C#.

Event-Based & Document-Based APIs

There are two main XML parser APIs. The simplest is SAX (Simple API for XML), the first API developed for XML. SAX was created in 1998 as SAX 1 and updated in 2001 as SAX 2 to account for the XML names specification. David Megginson, an author/developer of one of the first XML parsers, originally coordinated the development of SAX. Megginson and others



The illustration here details how an XML parser works. In short, the parser (which is a small software app) reads in an XML data. After the data has no fatal errors, the parser makes the data available to the overall application via a parser API.

realized a generic parser interface would help enormously in making XML a success. (Details on SAX are documented at www.saxproject.org.)

SAX is an event-based API. This means as the parser processes an XML document, it simply reports an "event" when it encounters a start tag, attribute (name and value), text content, end tags, and so on. The SAX API lets the application developer write code, called event handlers. These are called upon when the corresponding event takes place. Event handlers are essentially functions or methods written by the application programmer.

The following is a simple Java example using SAX 1.0. There are two parts. The first part is the main application, which contains the following lines:

```
Parser parser = ParserFactory.makeParser(“com.microstar.xml.SAXDriver”);
DocumentHandler handler = new MySAXHandler();
parser.setDocumentHandler(handler);
for (int i = 1; i < args.length; i++) { parser.parse(args[i]); }
```

The first line loads the XML parser; the string "com.microstar . . . " identifies the parser the program will use. If there were another SAX 1.0-aware XML parser available, you could replace the Microstar parser simply by changing this reference (SAX makes it that easy to replace one parser by another).

The second line shown creates a new DocumentHandler object using the programmer's MySAXHandler class. This class (discussed later) defines the SAX event handlers. The next two lines tell the application to read the command line arguments for the program and process each entry as an XML file. Thus, if this program were called demoSaxApp, the command "demoSaxApp file1.xml file2.xml" would load in file1.xml, parse and process it, and then do the same for file2.xml.

Given the previous code, the event handlers are defined in the MySAXHandler class, which is the second part of the previous example. An excerpt of the full code is:

```
public void startDocument (String name)
{ System.out.println(“Event: Start of document”); }
public void startElement (String name, AttributeList atts)
{ System.out.println(“Event: start element: “ + name); }
```

This defines two handlers, one for the start of a document and one for the start of an element. The SAX specification mandates the names for these methods and the arguments they must have. In this case, the handlers simply print that the event has taken place and, in the case of startElement, prints the element name. Obviously, more interesting apps would need to do more than this.

SAX is a lowest-common-denominator interface. It gives a programmer access to the XML data but does nothing else. The application program must include code to store and modify the data. Thus, SAX is used most often for such things as processing XML configuration files (the event handlers simply set the configuration properties as the data is parsed) or as a tool for creating more complex parser interfaces.

The second important interface is DOM (Document Object Model). This is a document-based API that works quite differently from SAX. Where SAX simply fires off a series of event handlers as it processes XML, a DOM-aware parser will actually create an in-memory "document object" containing all the data in the document. The DOM interface then provides methods that let the application access this document object, locating elements, attributes, and text based on their positions in the document tree. The interface also lets the program modify the document (adding nodes, changing nodes, and more), attach event handlers to the tree (for example, to detect when nodes have changed), and so on. DOM-like functionality is essential for many common XML apps, such as browsers, editors, and XML-aware databases.

So then, if DOM is more fully featured than SAX, why even use SAX? In short, sometimes XML apps really are simple and don't need the extra complexity and potential problems of DOM (you don't get the DOM features without a degradation in speed or performance). Also, you need to build a DOM interface somehow, and SAX is often used as a tool for building these more complex interfaces.

Next month we'll look at DOM in much more detail. In addition, we will sketch out a fairly simple DOM-based XML application. CPU

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by Ian Graham

(NOTE: Full examples of the documents in this article are available at www.smartcomputing.com/cpumag/jul02/xmlexamples or at www.utoronto.ca/ian/articles/jul02.)

Lisa Lopuck, www.lopuck.com, is a Web creative consultant helping companies define and plan their Web creative strategy, information flow, and visual look and feel. She is also the author of numerous best-selling books on Web design, including "Web Design for Dummies," and is a sought-after speaker at Web conferences and universities around the world.

by Lisa Lopuck

Web Design Workflow: Part III

In this final article of the Web Design Workflow series, I dive into the production of wireframes and the vital role they play in building a Web site. If you recall from last month's article, wireframes show the layout and content plan—in diagram form—of each major page of your Web site. A complete set of wireframes helps both you and the client previsualize the Web site before you begin production—averting the potentially heavy cost of redoing things down the line. In addition, because each page's wireframe shows the relative amount and placement of content on the screen, a set of wireframes also serves as the client's guide to producing and assembling the right amount of content.

How To Build Wireframes

You should build a wireframe diagram for each primary and secondary page in your Web site (all the pages that are represented on your main navigation system). For example, if your navigation bar has five main choices, you'd have one wireframe that details each of those five pages. If you click one of the five main choices and get a list of sub choices (like if you use a pull-down menu or submenu system), then you should build a wireframe for each of the subpages. You should also build a wireframe for any page in your site that has special content requirements like a Flash movie or illustration. In total, a medium-sized Web site of about 100 pages may have up to 50 wireframes. Pages you do not have to build wireframes for are lower level pages that use the same template (like a product page or a press-release page that is populated by a database into the same general layout). Simply build one wireframe for each template page that shows the layout plan.

> **A complete set of wireframes helps both you and the client previsualize the Web site before you begin production.**

What Should A Wireframe Look Like?

A wireframe should be a simplified, black-and-white line drawing. Think architectural blueprint! Any more detail than a line drawing starts to suggest a visual treatment—both to you and the client. You suddenly start thinking more about the look and feel and less about the structure and content of a page, and the client may think you are proposing a half-baked visual treatment! Remember, at this point, the focus is structure and overall layout.

Tools For Making Wireframes

My favorite tools for creating wireframes are Macromedia Freehand and Adobe Illustrator. You can, however, use almost any vector-based illustration program capable of drawing lines and boxes. After you draw the wireframe for the page, add a small box at the top of the page that contains information like the page's name, the date, and even your logo and the client's logo—just like a set of building blueprints would have.

Visual Design

Finally, once you have a completed set of wireframes, you can begin exploring the visual design of the Web site. Like a skeleton, a good wireframe is a simple diagram showing what content to include, the navigation structure, and the overall relative size and layout of elements. Therefore, a team of designers should be able to produce a number of different visual treatments from the wireframes.

After interviewing a client to get a sense of their tastes, I like to produce three different "design directions" for them to choose from. For each design direction, I do a home page treatment and a subpage treatment. Once a client chooses a design and we have a few rounds of refinement, production can begin! ■

WARNING:

This article contains excerpts and concepts presented in "Web Design for Dummies." Don't let the name fool you; the book is designed for creative professionals, and it covers a lot of advanced Web design topics and issues. Plus, it's a fun read. You can contact Lisa at lopuck@cpumag.com and see her work at www.lopuck.com.

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by Rob "Cmdr Taco" Malda

penymail.txt

Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

What if email cost a penny? No really, come back! I'm serious. I've been taking email for granted for a long time now, and I bet you do, too. Unfortunately you and I aren't the only people out there who are taking advantage of the speed of delivery; the ease of use; and yes, the low, low cost to reach millions of unsuspecting and uninterested bystanders.

You know who I'm talking about. I'm of course referring to "Them": the guys who want me to buy Viagra by the case; his buddy who assures me that some random four capital letters are going to make big moves on the market in the next few weeks, and I'd be a fool to pass up this opportunity; even the guys who can send me mail-order brides, pictures of naked women, inflatable women, or pictures of naked inflatable brides.

It's just out of control. Currently 75% of my mail is spam. I used to not care so much. A vast array of spam filters served their purpose for many years. And recently I've been using the amazing tool Spam Assassin (spamassassin.taint.org), which catches 80% to 90% of my spam and whisks it away to a special place where I can focus my rage on those days when I need stress relief. But I shouldn't have to do that, and I don't think I'm the only one.

It strikes me that there's a better way than calling in Uncle Sam to slap the wrists and wallets of these jerks.

I suppose we could regulate spam, but that's just messy. Freedom of speech issues start popping up. There are court fees and legal issues. And while I would gladly vote to ratify an amendment that granted an exception to the Cruel and Unusual clause in the Bill of Rights for punishments assigned to the bastards who promise me that the email they have just sent contains winning lotto numbers, it strikes me that there's a better way than calling in Uncle Sam to slap the wrists and wallets of these jerks.

So where were we? What if email cost a penny. First off, we immediately infinitely raised the cost of spamming. Sending a million emails offering a million people a chance to buy a CD containing a million email addresses now costs the spammer $10,000. He has to find an awful lot of suckers out there to break even on this business venture. Suddenly spammers have to target their crap better, and quite frankly, if spam were better targeted, it probably wouldn't suck so much. If you got two spams a day, but they were targeted to your actual needs and not just offers to refinance your mortgage, well you wouldn't be worrying about filtering so much, would you?

But the question is what to do with the penny that each of these emails costs. Let me propose something that will never actually happen but would really be interesting. When a user gets an email, he needs to actively participate in the process. He needs to decide if the email that just popped into his inbox was good or not. Maybe the sender was a spammer or a flamer. Or maybe he forgot to read the FAQ. Regardless, if you don't want the email, you keep the penny. Well, you don't exactly keep the penny; your ISP does: It gives you a penny credit toward your next month's postage, or maybe toward your monthly fee. If you actually wanted the email, you have a button to refund the penny to the sender, so the email they sent was free after all.

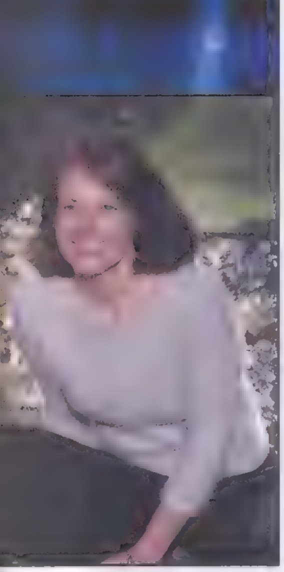
So what happens? First off spammers start to subsidize the infrastructure they are abusing. The ISPs recoup a little cash because it's costing them a fortune to handle all the SMTP traffic generated by these jerks. And we get a simple feedback mechanism to say "Thank you" and "No Thank You" for email.

Sure, it's technically infeasible given the limitations of the SMTP protocol. And it'll never happen because it requires a level of standardization amongst ISPs that is unlikely to happen unless a monopoly throws its weight into some sort of proprietary protocol that accomplishes this task. And sure, it requires the holy grail of micropayments to magically exist, but I can't solve all the 'Net's problems in just a single 700-word column! ■

You can email Rob at malda@cpumag.com. He won't charge you a penny . . . this week.

by Joan Wood

Open Source & CBDTPA



Starting as gopher for the Emmy-winning team that pioneered live in-car TV cameras for the Indy 500, Joan became an independent video/sound engineer, technical director, and producer. Playing with Reality Engines and motion platforms led to co-founding Xatrix Entertainment where she produced the two Cyberia games. Before 3D acceleration was trendy, she formed Mango Grits to develop hardware-only game Barrage forActivision. Since cashing out from SharkyExtreme.Com, where she was co-founder and managing editor, Joan has retired.

Thanks to the DMCA (Digital Millennium Copyright Act), it is already illegal to link to a tool that allows Linux users to play legally purchased DVDs on their computers because it bypasses the necessity to play the material on an approved DVD Copy Control Association licensed player. If Senate bill S.2048 becomes law, this will seem like the good old days. Maybe Napster pushed things too far, but Hollywood has lumped pirates, hackers, open source, and your Mom into the same category, and the pendulum is still swinging. Make no mistake: The future of your digital world is under siege.

The historic "fair use" rights, granted in legislation and court rulings, that have allowed your Mom to legally record a TV program for later viewing or dub a CD to a cassette have never set well with the entertainment industry. It always wanted single-play, prerecorded videocassettes; it just didn't get them. Well, Hollywood would like to take this opportunity to correct its previous errors in allowing you to "time-shift," "space-shift," make a backup copy, and create your own "Chipmunks Greatest Hits" CD. Disrupting open source is probably just a welcome side effect. Washington seems desperate to help.

Hollywood has lumped pirates, hackers, open source, and your Mom into the same category.

Last year, Senator Ernest F. Hollings, chairman of the Committee on Commerce, Science, and Transportation, penned the initial draft of the "Security Systems Standards and Certification Act" (SSSCA), which has become the "Consumer Broadband and Digital Television Promotion Act" (CBDTPA), the title of which is really more to their point: The government is alarmed at the enormous investment in broadband and digital television infrastructure that is going mostly untapped by consumers and thinks (probably correctly) that entertainment industry content is the answer. In other words, Hollywood can save Telecom if properly motivated. But Hollywood is terrified of letting its digital content out into the world, and its target isn't mass production pirate operations, it's you.

Using the specter of rampant piracy and the easy access of illegal online content, Hollywood has lobbied hard for legislation to criminalize technology that would allow exercising of "fair use" rights once its proposed copy protection scheme is in place. A set of standards for copy protection will be incorporated into every electronic device capable of content playback, including your PC. Tampering with or disabling this copy protection, even for legal activities, would be a crime. If the involved parties (the entertainment, consumer electronics, and IT industries) cannot agree on these standards within a set time period, the standards will be mandated by government legislation. It's a toss-up which is worse: a PC with functional limitations designed by Hollywood or one with features mandated by Washington.

Consumer electronics bigwigs are alarmed by those choices, too, and despite Senate testimony from Intel, Philips, and others voicing strong opposition to the direction of the bill, including fair use and bad science issues, they have now become part of the process more or less on Hollywood's terms. They've joined the Motion Picture Association of America's BPDG (Broadcast Protection Discussion Group), a subgroup of the equally powerful but more open Copy Protection Technical Working Group (cptwg.org). The BPDG does not publicize its meetings and has no members representing consumers; yet it is tasked with proposing the standards we will all live with for a very long time. The direction this group is taking could have enormous impact on open-source software, as it may make illegal any content not using the group's protection scheme. That content could become unreadable by all legal devices and thus untransmittable over the Internet. Hackers would always find ways around that, but all of their activities to do so would also be deemed illegal, including discussion of potential methods.

Fight Back. Ongoing coverage of the issues is available at: **Electronic Frontier Foundation** (**eff.org**); CPTWG and BPDG meetings are reported at **bpdg.blogs.eff.org**, **DigitalConsumer.org** (created a "Consumer Technology Bill of Rights" and offers ways to get involved in turning it into law), **Home Recording Rights Coalition** (**hrrc.org**), and **The Digital Speech Project** (**digitalspeech.org**). The **U.S. Senate** has set up a section of its site for this issue: **www.senate.gov/~judiciary/special/feature.cfm.** ■

Soapbox for rent at joan@cpumag.com

by Chad Denton

Road Warrior

Batteries With Brains, PDA Companions, Sappy Conversations, Shiny Apples & More From the Mobile Front

AT&T Introduces mMode

Wireless data hasn't really caught on in the States yet. For some reason consumers aren't lining up to pay for slow-paced (yet expensive) wireless data. This may change, however, as faster GPRS-compatible networks are introduced. A few months ago, VoiceStream announced its iStream GPRS service in the States. Now AT&T Wireless (www.attws.com) is jumping on the GPRS bandwagon with mMode.

Prices for mMode service plans are affordable but limited. Like iStream, mMode's entry-level plan starts at $2.99 per month but delivers a little less. iStream lets users send and receive as much as 1MB of data a month without additional charges; mMode charges 2 cents for each kilobyte of data sent and received over 1MB.

As you move into higher-priced plans, iStream and mMode vary considerably. While iStream's more expensive plans are set up primarily for users connecting other devices (such as PDAs and notebooks) to the Internet, all of mMode's service plans focus on phone access. For $7.99 a month, mMode users can send and receive as much as 1MB of data without additional fees. Every kilobyte above 1MB is just 1 cent. For $12.49, mMode users get 2MB of data with the same 1-cent fee per additional kilobyte. iStream's next cheapest plan is $19.99 for 5MB of data, with plans running as high as $59.99 a month for 20MB.

New phones are needed for the service. One interesting model is the Sony Ericsson T68m ($199.99), which includes a 256-color display and integrated Bluetooth. An optional wireless headset lets you talk without removing the phone from your briefcase; MP3 and digital camera modules are in the works.

Service is limited to areas where AT&T Wireless has upgraded its GSM service to support GPRS. Initial availability includes Chicago, Dallas, Detroit, Indianapolis, Seattle, Las Vegas, Phoenix, Portland, Kansas City, and much of central and southern Florida, including Miami and Orlando. ▲

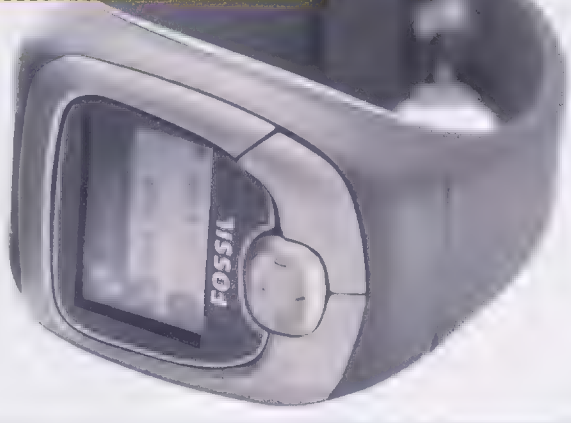
Sony Ericsson's T68m mobile phone supports AT&T Wireless' mMode service. The new phone also includes Bluetooth support and a wireless headset that lets you talk on the phone without removing the phone from your briefcase.

Great, Another Thing To Sync

PDAs are often thought of as PC companions—a portable dumping ground for personal information normally stored and sorted on a PC. Doesn't then the idea of a companion for a PC companion seem a bit strange? That's like Mini-Me having his own mini-Mini-Me.

Nonetheless, the evil scientists at Fossil have introduced a watch that doubles as a PDA companion. The Wrist PDA ($145; www.fossil.com) has 190KB of flash memory and an infrared port that lets you beam personal data from a Palm OS device. A small app that resides on the PDA lets you decide what information to beam to the watch. For example, you can beam your personal contacts to the watch but not your business contacts. The app also monitors the total data you transfer so you don't exceed the 190KB limit. You can transfer appointments, tasks, contacts, and memos, and the watch can accept business cards beamed from other Palms that don't have the Fossil software installed.

The Wrist PDA only supports Palm OS devices. At press time, Fossil was accepting preorders for a Wrist PDA/PC product that will be compatible with Pocket PC devices. ▲



Do PDAs really need companions? Fossil's new Wrist PDA lets Palm OS users beam personal data, including appointments, contacts, tasks, and memos, to the watch. The watch can also accept business cards from other Palm users' devices.

Mmm . . . Titanium Apples

Like a certain big blue superhero, bright shiny objects easily distract us. We blame our low SAT scores on the shiny band holding the eraser on our No. 2 pencil. The only thing better than a bright, shiny object is a bright, shiny object with a processor. In April, Apple released its new line of G4 Titanium PowerBooks ($2,499 to $3,799; www.apple.com), giving shiny-object lovers (and road-weary Apple aficionados) everywhere something new to dream about.

The models feature either a 667MHz or 800MHz PowerPC G4 processor and up to 1GB of PC133 SDRAM. The display still measures 15.2 inches wide, but the resolution has improved from 1,152 x 768 to 1,280 x 854. The 800MHz model includes an integrated AirPort card (Apple-speak for 802.11b), and both models include a modem and Gigabit Ethernet (1000Mbps).

Another notable addition is a DVI port that lets you connect a PowerBook to digital flat-panel displays. A DVI to ADC (Apple Display Connector) adapter lets you connect a PowerBook to Apple Cinema HD displays. The adapter costs $150, but if you can afford the PowerBook and a Cinema HD display, you're probably not hard up for cash.

All of this and more is rolled into a tight package about an inch thick and weighing slightly more than 5 pounds. Did I mention the titanium case is shiny?

Smarter Battery Monitors

Anyone who has ever gotten 60 minutes out of a battery supposedly charged to 90% capacity knows how accurate some battery monitors are. The problem is that other factors, including the battery's age and physical condition, play an important role in determining battery life. Unfortunately, battery meters don't currently take such information into account. As a result, a 90% charge on a year-old battery isn't the same as on a new battery.

Researchers at Penn State University have developed a battery monitor developed from off-the-shelf parts that uses electrical impedance (monitoring how a signal changes after being passed through a battery) to determine the battery's age, condition, and the percentage that the battery is charged. Using this information, the monitor makes an informed guess as to how much longer the battery will last.

Notebook batteries are the natural focus here, but you can use the monitors on any sort of battery, from car and boat batteries to AAA alkaline batteries. The monitor uses a very small charge to take its readings, letting it use leftover power in the battery being tested. A new model roughly the size of a deck of cards is currently in development.

Apple's bright and shiny G4 PowerBooks feature faster processors, an ATI Mobility Radeon 7500 graphics card, Gigabit Ethernet, and a DVI port for connecting to digital flat-panel displays.

UK Study Confirms: Married Couples Push A Good Thing Too Far

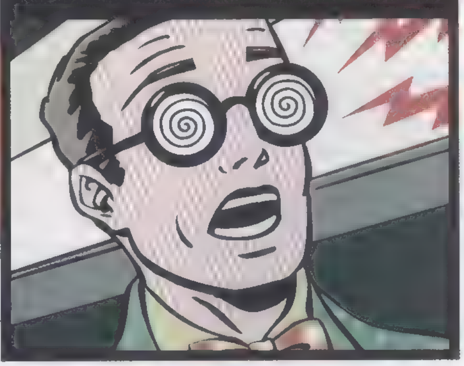
We've all run across those people who think cell phones are the work of the devil. We always thought this was just some neo-Luddite reaction. Now we're rethinking the notion.

A recent BBC article focused on a study conducted by Orange (www.orange.co.uk), a United Kingdom wireless communications company. The study stated that 80% of UK couples surveyed called each other during their morning commutes, often just minutes after saying "good-bye." In addition, 67% reported using a mobile phone to nag their significant others (a good reason to make sure you have voice mail and caller ID). Nearly three-quarters of those surveyed reported using a mobile phone to inform their loved ones they were going to be late to work.

Just so you married types know, these kinds of things sicken us singles. However, we are more comfortable with the 25% of wireless UK customers who use their mobile phones to tell their loved ones they're stuck in traffic—while actually knocking back another round at the pub. If these numbers hold true across the pond, at least one of every four of our married friends will be staying for another round.

Compiled by Samit G. Choudhuri & Chris Trumble

At Your Leisure



Plug In, Sit Back & Fire Away

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in game consoles, games, PCs, DVDs, and just stuff we love, read on.

Resident Evil
Evil Has A New Address

Most gamers can quickly tell you about one game that grabbed their imaginations and sucked them into huge marathon gaming sessions. For many, that game was Resident Evil, and now it's found a new home on Nintendo's GameCube.

For the uninitiated, in RE you play as either Chris Redfield or Jill Valentine, both members of the fictional Raccoon City Police Department's elite S.T.A.R.S. (Special Tactics and Rescue Squad). You find yourself in a huge mansion with an attached compound of buildings and underground facilities swarming with flesh-eating zombies and a cornucopia of other nasties. The idea is to stay alive long enough to figure out what's going on and escape.

Jill has to beat the boys off with a stick!

The game's new look is *gorgeous*. If you've played the original, you'll scarcely recognize all the old areas and the new ones will take your breath away. Capcom also updated the voiceovers and much of the once-cheesy dialogue. But the new RE is much more than just a gussied-up remake; in addition to including every inch of the original game, Capcom added a slew of brand new areas, puzzles, and monsters. We don't want to spoil any surprises, but if you think you're prepared, think again.

RE's control scheme is largely unchanged, although Capcom wisely included a few elements that showed up in sequels to the original (the instant 180 move for tight spaces and the ability to seamlessly walk up and down steps without annoying loading sequences). The new addition of defense weapons is a nice touch, too.

You'll catch your breath each time lightning illuminates a room through multiple windows.

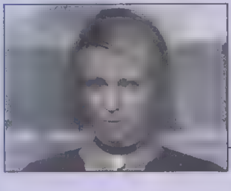
In short, if you don't have a GameCube yet, it's time to get one.

Resident Evil (NGC)

$49.99
Capcom
www.capcom.com

Check These Out On The Web

See our reviews of Silent Hill 2: Restless Dreams (Xbox) and Giants: Citizen Kabuto (PS2) at www.smartcomputing.com/cpumag/jul02/gamereviews.



In Konami's **Silent Hill 2: Restless Dreams** (Xbox), anything can happen. You'll run into Maria here, who seems to be a psycho version of your dead wife, Mary.

You'll meet this pleasant fellow in Interplay's **Giants: Citizen Kabuto** (PS2). You'll get a chance to play as his female counterpart, along with two other alien species, each with their own strengths and weaknesses.

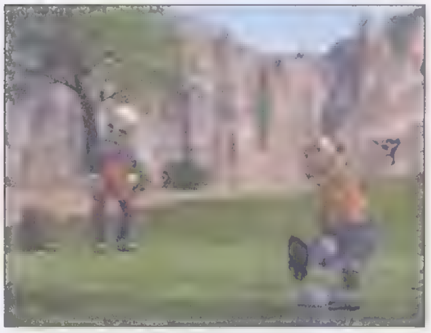
Hot Shots Golf 3

Please Replace Your Divots

Sometimes the idea of golf is more attractive than actually playing it. All you want to do is grip it and rip it, but you have to haul your clubs around for hours in the hot sun while observing a rather strict code of etiquette. And if your game goes sour somewhere around the seventh hole, you can't just start over.

Sometimes, even golf video games can make you feel this way, but not Hot Shots Golf 3. This game is all about fun. No intense concentration, no intricate controller combo moves, just quick and easy golf. Shot strength and accuracy rely simply upon pressing the PS2 controller's X button just as the Shot Meter reaches the desired length on its way left and again when it hits the precise point in its Impact Zone as it travels back to the right. You can use the directional controls to add spin, and of course you can select different clubs to affect overall shot strength, but that's about all there is to it.

And instead of putting you in control of pensive, boring, "real" golfers, HSG3 lets you choose from a gallery of cute, cartoonish characters that say and do some pretty funny stuff throughout the game. Put all this together with a simple game setup menu, great multiplayer options, and course graphics that rival the reigning "serious" golf game, and you've got yourself a heckuva party game. Or, just a great way to scratch that golfing itch without paying a green fee and putting on pants.



Pete is one of the characters you can use when you get started. He's a likeable fellow, and when teamed up with a smart caddie like Frank, he'll help you get off on the right foot.

Hot Shots Golf 3 (PS2)

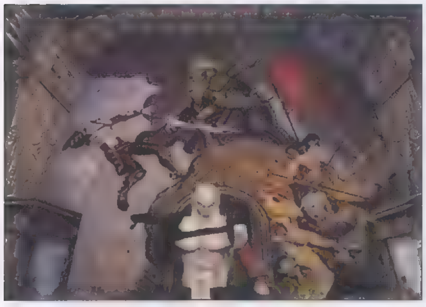
$49.99

Sony Computer Entertainment America

www.scea.com

Blood Omen 2

Kain's Back & Feeling A Bit Peckish



Kain strikes a pose in front of a mural depicting the Sarafan Lord giving him the smackdown.

In the first Blood Omen game (for the PlayStation in 1996), Kain was an arrogant human until a pack of ruffians murdered him in an apparently random act of violence. Supernatural forces offered him resurrection with one catch: He had to come back as a vampire. He agreed, then battled his way through a series of enemies and their minions, seeking revenge. At the end of the game, Kain chose to rule the land of Nosgoth himself, thereby plunging it into darkness.

Blood Omen 2 picks up after its namesake, chronologically falling well before the events of Soul Reaver and Soul Reaver 2 (although it is the fourth game to be released). After ascending to power in the first game, Kain gathered a vampire army and ravaged the land of Nosgoth, crushing everyone in his path until he ran into the Sarafan Lord, the mighty leader of a human order devoted to stamping out all vampires. The Sarafan Lord defeated Kain, leaving him dormant for 200 years. Now he's awake and (once again) he wants revenge.

BO2 is a good-looking, third-person action game with a dark, gothic atmosphere. The Xbox and PS2 versions look nearly identical, although the PS2 game tends to drop a few frames now and then. It falls into a genre that is much closer to that of the Soul Reaver games than it is to its predecessor, which was a top-down RPG with real-time combat. It is unlike any of the others, however, in that it is a little too linear in nature. Gone is the ability to freely explore any of the areas of Nosgoth where you've already been, which is one of the things we loved about the series up to now.

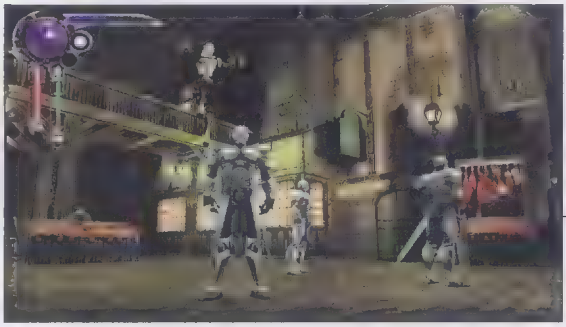
Despite this gripe, however, and despite the fact that it has a tendency to be slightly repetitive at times, we enjoyed BO2. The skills Kain develops as the game progresses keep things fresh, because they let the gameplay evolve a bit at a time. And besides, sometimes it's fun being bad, and Kain is bad to the bone.

Blood Omen 2 (Xbox/PS2)

$49.99

Eidos

www.eidosinteractive.com



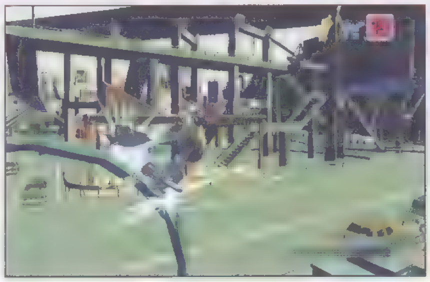
These guards may be a tough lot, but Kain's dark gifts give him the element of surprise.

Jet Set Radio Future

Extreme Skating Climbs To New Heights

Graffiti. Inline skating. Flight. What do these items have in common? You guessed it: Jet Set Radio Future. The setting is Tokyo in 2024. You jump in as Yoyo, the newest member of a well-regarded roller blading gang (the GGs) and work at invading rival gang turf while spray painting over their graffiti. All the while you'll have to stave off the Rokkaku Group (a villainous conglomerate that's out to rule Tokyo); this is made more difficult because the cops are in the Rokkaku Group's deep pockets. You will skate around from a third-person POV to meet objectives, such as spray painting over rival graffiti, combating cops, racing and recruiting new characters, and so on.

You can choose a character from the GGs and use it to complete your mission objective. This entails skating around in a way that makes Tony Hawk look like a lazy iguana. You can grind any edge in the game, jump hundreds of feet, and do all sorts of tricks. It's really a lot of fun, even for those of us who aren't too big on the skating video game genre.



Screenshots don't do justice to JSRF's cel-shaded graphics unless seen in action.

JSRF's entertaining gameplay combines with a unique graphical look and audio leads to make a product that's far from the usual thoroughfare. The developer has created a graphic masterpiece: the cel-shaded graphics that look amazing in action. Characters in JSRF move realistically, shadows look accurate, environments are huge and interactive, and the frame rate is like buttah. Screenshots don't do the game justice because there's just no way you can appreciate the fantastic visuals without seeing the game in action. The audio is certainly not an afterthought: JSRF's soundtrack is a smorgasbord of funky-cool techno dance music; it's so good even your characters will start dancing on the spot during idle moments.

Jet Set Radio Future, is an Xbox exclusive. Even you folks with little interest in skating and "extreme" games may find something to like.

Jet Set Radio Future (Xbox)

$49.99
Sega
www.sega.com/sega/game/jsrf_launch.jhtml

Dungeon Siege

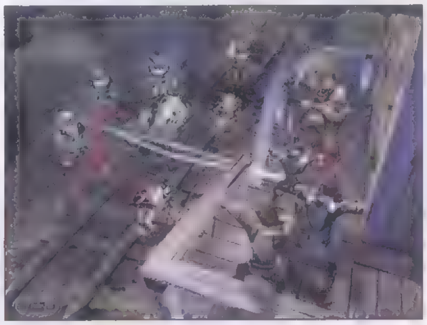
RPG-Lite Done Right

Gas Powered Games' Dungeon Siege had a lot of buzz and great development pedigree (with Chris Taylor, the creator of Total Annihilation, at the helm). It's finally here, but does it live up to the hype? Yes, and then some.

The game starts with you, a simple farmer doing a favor for a dying friend. Eventually the fate of the kingdom rests on your shoulders. Your characters start with nothing and slowly get better Melee, Ranged, and Magic attributes as they use and improve specific skills.

You command a party of as many as eight characters in your journey. This is easier than it sounds: You can push the Spacebar to pause the game and adjust equipment and party formations at any time. It almost ends up feeling like a mini-RTS.

Dungeon Siege sweats eye candy. Indoor/outdoor transitions are seamless, and the graphics reflect the creator's attention to detail in every nook and cranny. The best part is that the stunning graphics only enhance the game's addictive gameplay.



Controlling eight characters in real-time sounds cumbersome, but it's easy in practice.

Dungeon Siege (PC)

$54.95
Microsoft Games Studios
www.dungeonsiege.com

DVD Byte by Todd Doogan

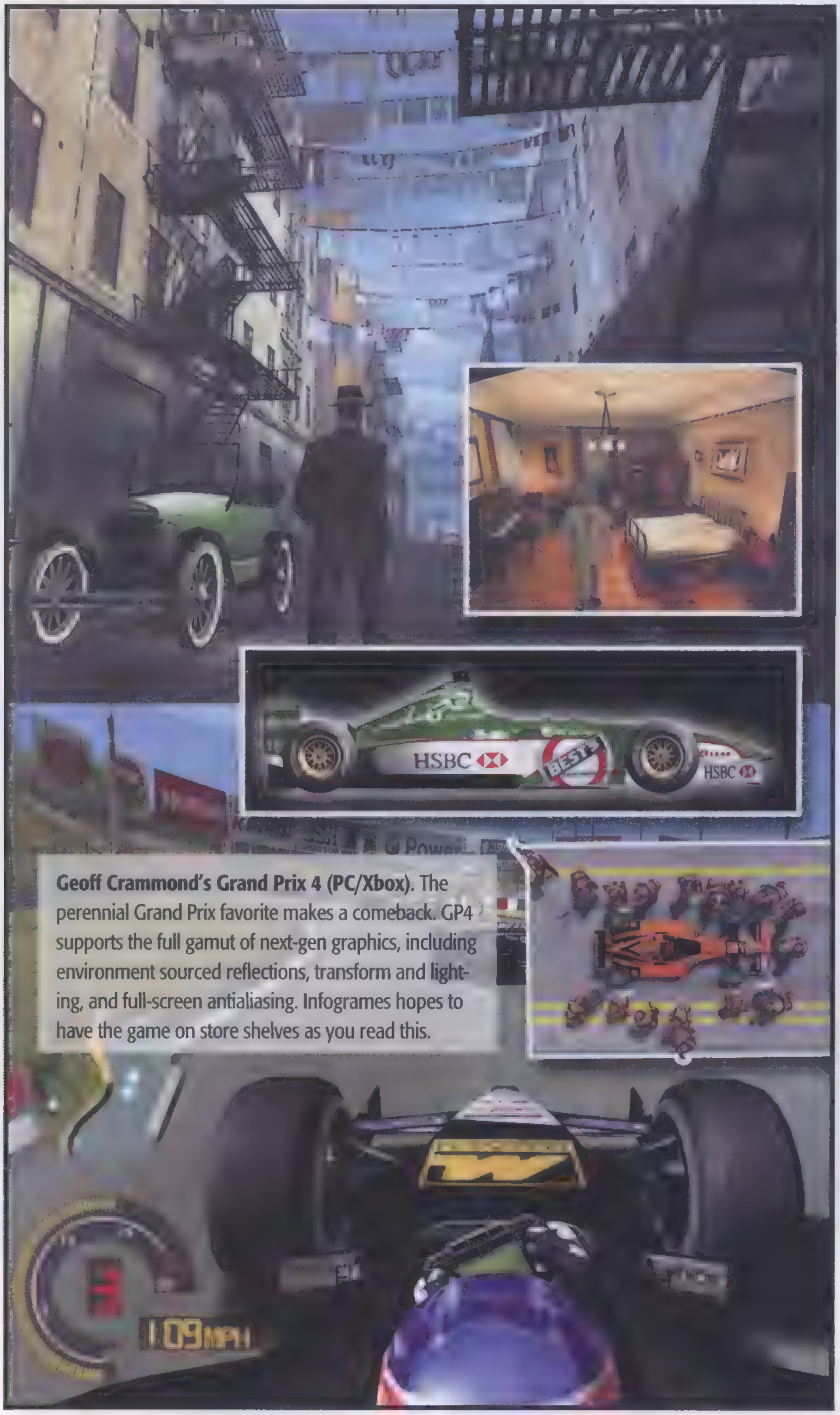
THE DIGITAL BITS
we know dvd

Book phenomena, blockbuster film, and future film franchise: Harry Potter is the MAN. Warner's two-disc collector's set (available in anamorphic widescreen and pan and scan) is a nice effort but ultimately an empty one. The film only looks OK, and there's a bit too much grain present. Sound is much better; it represents the film well, but the extras are insulting. The supplemental material is on the second disc, and it's mostly game-based. And lame games to boot. The only real extras worth seeing are a handful of deleted scenes that are hidden with a game that takes about 15 minutes to play even with detailed instructions. Although the scenes are neat, they aren't worth the time, and neither is this disc. This might please the little ones in your family, but for everyone else, Harry Potter is out of magic, at least on DVD.

Harry Potter

Hot Shots: The Beauty Of The Game

Yeah, we know it's all about the gameplay. Who needs eye candy, right? (Or so grognards and some "old school" gamers like to moan.) Sure, we loved Wastelands, Elite, Railroad Tycoon, Willy Beamish, and Jet Set Willy as much as the next guy. But we also know there's nothing better than stellar gameplay combined with knockout graphics to make that killer game. These games all have potential.



Mafia (PC). Craving third-person mobster action? Developer Illusion Softworks makes you an offer you can't refuse by taking you back 70 years to the mafia underworld. You will rise through the ranks of the Salieri family gangland style in the City of Lost Heaven, which features 12 square miles of simulated streets, traffic, and buildings.

Geoff Crammond's Grand Prix 4 (PC/Xbox). The perennial Grand Prix favorite makes a comeback. GP4 supports the full gamut of next-gen graphics, including environment sourced reflections, transform and lighting, and full-screen antialiasing. Infogrames hopes to have the game on store shelves as you read this.

Infinite Loop

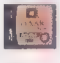
We've Come A Long Way

Widely regarded as the world's first general-purpose digital computer, the ENIAC (Electronic Numerical Integrator And Calculator) was completed in 1946 at the University of Pennsylvania and occupied roughly 167 square meters (about 1,800 square feet). In 1995, a group of students in the Moore School of Electrical Engineering at the University of Pennsylvania replaced the vacuum tubes used in the original ENIAC with 174,569 transistors. The result was a 39 square millimeter microchip that could do everything the original ENIAC could do. By way of comparison, Intel's new Northwood core measures 146 square millimeters and includes roughly 55 million transistors.

Assuming that a vacuum tube computer would require 167 square meters to equal the processing power of 174,569 transistors, we can estimate that it would take roughly 57,750 square meters (nearly 14 football fields) to provide the same amount of processing power as a Northwood Pentium 4. Have fun finding room for a vacuum-powered GeForce4.

[illegible]
LEXAR
SPELL
check is useless for things words can't describe.

While we can't put into words the impact of a Nikon digital image, we can tell you a little about the camera that created this one. Introducing the Coolpix 995. It comes fully loaded with 3.34 megapixel resolution, 4x Optical Zoom-Nikkor lens, automatic exposure with manual override, a pop-up Speedlight, and a quick review feature that instantly allows you to scroll through your images. With this many options, the only limit is your imagination. Visit nikonusa.com or call 1-800-NIKON-UX.



Nikon
WE TAKE THE WORLD'S GREATEST PICTURES. YOURS.

The Coolpix 995.

SOFTWARE TIPS & PROJECTS

Feel The Overburn

CD-R/RW DRIVES HAVE BECOME UBIQUITOUS IN RECENT PCs. BURNING AND RIPPING CDs ARE NO LONGER DARK ARTS RESERVED FOR HOPELESS geek shut-ins. Now even your kid sister knows how to burn a custom-made Jessica Simpson collection to play on her pink Hello Kitty portable CD player. Not to worry, hotshot. There are still a few secrets left for us wizards in the CD-writing business, and we are here to uncover a few of them this month and next. Sure, Sis can burn a CD, but can she overburn one? Ouch. We didn't think so.

From Burning To Scorching

Ever wish there were just a few more minutes of recording time on a CD-R? Just enough to fit one more ABBA classic on that CD of guilty pleasures you're burning? Given the right disc, CD-R/RW drive, and CD writer software, you might be able to do just that by overburning more data to a CD-R than the label says it can fit. Follow our project outline below, and you will never have to do without "Dancing Queen" again.

Every blank CD has at least 90 extra seconds of empty space called a leadout, which tells your CD drive that it has come to the end of the disc. This is required by the Red Book CD audio standard, although manufacturers sometimes include larger leadouts than the minimum 90 seconds. Some CD writing software lets you overburn a disc so that you can take advantage of this spare space. So a 74-minute CD might be able to fit up to 76 minutes of audio, or a blank rated for 80 minutes might be able to hold 82 minutes of actual audio. Some hot shots claim they have seen 74-minute CDs carry as many as 79 minutes of data. As you will see in our overburning project with the Feurio, Nero, and DiscJuggler CD writing programs, your own mileage may vary.

More, Please

It looks like overburning 74-minute and 80-minute CDs will soon become old news. A CD duplication supplier company called That's Write (www.thatswrite.com) was among the first to distribute 80-minute blanks, and it now offers 90-minute CDs, with reports of 99-minute and 120-minute writeable discs on the way. The catch for such storage largesse? For now, these discs work with only a small number of drives, including the Mitsumi 4804TE.

Before you begin. Before you turn your burner on high, heed a few reasonable caveats: First, be forewarned that overburned discs can be unreadable on some or all CD players. You are working outside of both software and hardware specs here. Worse, there is a slight chance you can damage your CD-R/RW drive because you are mucking about with the part of the CD that tells your drive to stop playing.

Furthermore, not all CD-burning drives can handle overburning. We had success with our Plextor 24/10/40A drive, and some veteran disc scorchers say Yamaha is also up to the job. Finally, don't expect the CD-writing software you got bundled with your drive to handle these chores. For instance, the ubiquitous Roxio CD Easy Creator out and out refuses to consider writing data beyond the disc's official parameters. For this kind of dirty work, you will need to hit the Web and get some hardcore CD-burning software.

We used a Plextor PlexWriter 24/10/40A CD-RW drive for all the tests in this project and blank CDs from Memorex, Fuji, and TDK. No one brand emerged as a better or worse candidate for overburning.

Sniff Your Disc

The first step to a successful overburn is testing your blank CD for its true capacity. We began with the Feurio CD-Writer (version 1.65). Not only does this program come with utilities that make overburning easy, but the company also maintains an online database of CD-R/RW drive models and whether they can handle overburning.

Feurio comes in two pieces: the CD Manager, where you assemble projects for copying, and the CD Writer, where you do the actual burning. With a blank CD in your drive, launch CD Writer and click Test Capacity Of CD-R in the Extras menu. Feurio will do a mock writing session on the disc to determine the available space. Once Feurio analyzes a disc from a particular manufacturer, it catalogs the true space available in a database because it is likely that other discs from the same maker will have similar leadout space available. Our 700MB CD-R rated for 80 Minutes (Memorex) tested to a capacity of about 82 minutes.

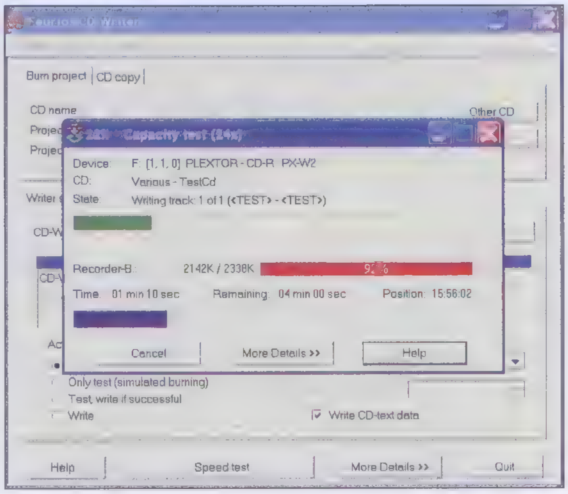
Burn On

Now you can open Feurio CD Manager to create your CD project of something closer to 82 minutes. We used MP3s for this test, so Feurio had to decompress them into Red Book CD audio format. As you drag and drop source files into the project window, keep an eye on the Used Time and Free columns of the project window. The Free column will go into negative numbers as you write beyond the official spec for the disc.

When you drag an MP3 from your source window to the project window, a pop-up dialog box asks if you want to decompress the MP3 now or when you write to the CD. Elect to do it now because this seems to give you more accurate tracking of how much audio time is used and still free on the project.

We discovered that every second counts when calculating a project for overburning. Despite the 82-minute true capacity for our test disc, the CD refused to accept a full two minutes of extra data. Eighty-two minutes of golden oldie goodness resulted in an error message that the disc leadout was rejecting the project because it was too big. In the end, we had to cut the project back to just over 80 minutes in order to make it work. So all we netted from being a spec-killing overburner were a lousy 20 seconds, barely enough for Barry Manilow to get a good rhythm going.

But the overburn did work, and the disc played flawlessly in every CD player we tried. This inconsistency between what Feurio said we could overburn and what actually fit proved to be one of the hobgoblins of overburning among all the programs we tried. Most discs under Feurio burned just under the capacity test estimate, and Feurio was the only program to give us even a ballpark estimate of what to expect from a blank CD.



Device: F: [1, 1, 0] PLEXTOR - CD-R PX-W2

CD: Various - TestCd

State: Writing track: 1 of 1 (<TEST> - <TEST>)

Recorder-B: 2142K / 2338K 92%

Time: 01 min 10 sec Remaining: 04 min 00 sec Position: 15:56:02

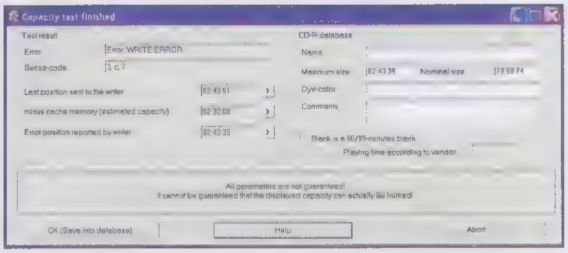
○ Only test (simulated burning)

○ Test write if successful

○ Write

☑ Write CD-text data

Disc-burning software Feurio CD Writer can test the actual capacity of a blank CD before writing to it.



Error: Error: WRITE ERROR

Sense-code: 3, c, 7

Last position sent to the writer: 82:43:51

minus cache memory (estimated capacity): 82:30:08

Error position reported by writer: 82:43:39

Name:

Maximum size: 82:43:39 Nominal size: 79:59:74

Dye-color:

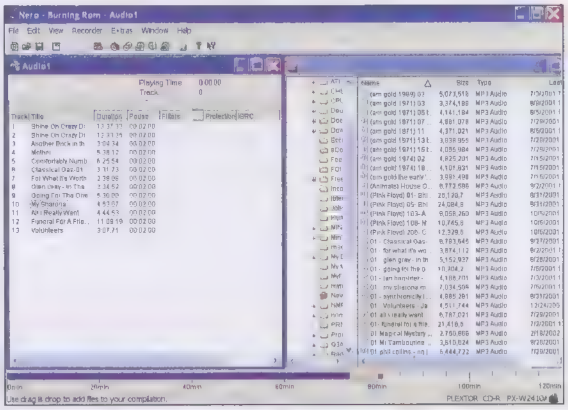
Comments:

☐ Blank is a 90/99-minutes blank

Playing time according to vendor

All parameters are not guaranteed!
It cannot be guaranteed that the displayed capacity can actually be burned!

Fuerio's Test Capacity function simulates writing to the disc until it receives an error message. Notice the checkbox on the right side, which lets the program write to the newest 90- and 99-minute CDs.



Playing Time 0:00:00

Track 0

Track	Title	Duration	Pause	Filters	Protection	ISRC
1	Shine On Crazy D	13:37:37	00:02:00			
2	Shine On Crazy D	12:33:35	00:02:00			
3	Another Brick in th	3:09:34	00:02:00			
4	Mother	5:38:12	00:02:00			
5	Comfortably Numb	6:25:54	00:02:00			
6	Classical Gas-01	3:31:73	00:02:00			
7	For What It's Worth	2:38:08	00:02:00			
8	Glen Gray - In The	3:34:52	00:02:00			
9	Going For The One	5:30:00	00:02:00			
10	My Sharona	4:53:07	00:02:00			
11	All I Really Want	4:44:53	00:02:00			
12	Funeral For A Frie...	11:08:19	00:02:00			
13	Volunteers	3:07:71	00:02:00			

Use drag & drop to add files to your compilation.

Nero uses a multicolored bar to indicate when you have reached a disc's capacity and are starting to overburn.

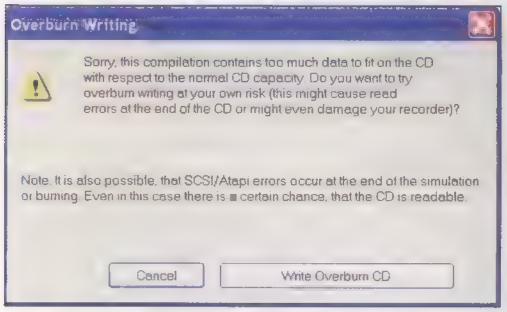
Don't be discouraged, though. We found that rewriteable discs offer an even greater overburn gain. On a FujiFilm CD-RW rated for 74 minutes and 650MB, Feurio tested its capacity out at 77 minutes, 24 seconds. Again, our attempt to get close to the tested capacity (77 minutes of Red Book audio) produced an error message and a refusal to write. But at 76 minutes of data, we were able to complete the burn and net about two minutes of extra music. Some CD jockeys warn against overburning CD-RWs, as it may be impossible for other drives and software to erase the full CD-RW for reuse later. We experienced none of this with the CD-RW we overburned by two full minutes in Feurio. Roxio CD Creator erased it cleanly.

As Nero Fiddles

Ahead Software's Nero 5 Burning Rom (www.nero.com) is arguably more popular than Feurio, but it is not quite as overburn-friendly. You must tell Nero specifically to allow overburning by choosing Preferences from the File menu and clicking the Expert Options tab. Here you must click the Enable Overburn 'Disc At Once' Burning checkbox. Nero's default burn maximum is 82 minutes. It is best to keep that default for starters.

In this test, as before, we made a moldy oldies CD with various MP3s. You drag and drop files from Nero's File Browser into the project window, and a visual gauge indicates whether they exceed the disc's capacity. We recommend first trying to overburn a disc by about a minute or a minute and a half. With your file list complete, choose Write CD from the File menu. If you don't want help, click the Close Wizard button. Make sure the Write Method text box is set to Disc-at-Once. Click Write to start the process (or Burn, if you're using the wizard). Nero will pop up a warning that you are trying to write too much data to the disc; click Write Overburn CD to override the warning.

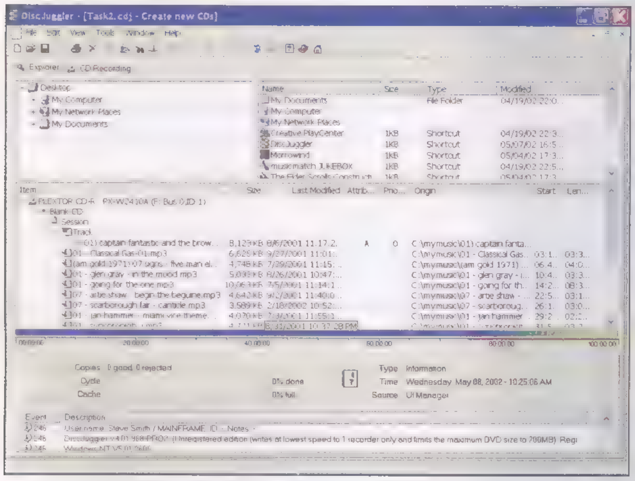
In our tests, Nero did burn the extra 90 seconds onto an 80-minute TDK CD, but in one case, the burning software hung at the end of the process, even though the progress bar indicated that 100% of the CD had been written. This behavior occurred repeatedly for us, but oddly enough, it sometimes resulted in properly burned discs. In another instance, Nero reported an error message that the burning had failed, producing an unusable disc. It seems wise to overburn in small increments at first and stick with the same manufacturer's blank CDs in



Sorry, this compilation contains too much data to fit on the CD with respect to the normal CD capacity. Do you want to try overburn writing at your own risk (this might cause read errors at the end of the CD or might even damage your recorder)?

Note: It is also possible, that SCSI/Atapi errors occur at the end of the simulation or burning. Even in this case there is a certain chance, that the CD is readable.

Nero will give users an overburn warning before proceeding to write data to the leadout section of the disc.



Name	Size	Type	Modified
My Documents		File Folder	04/19/02 22:0...
My Computer			
My Network Places			
Creative PlayCenter	1KB	Shortcut	04/19/02 22:3...
DiscJuggler	1KB	Shortcut	05/07/02 16:5...
Morrowind	1KB	Shortcut	05/04/02 17:3...
musicmatch JUKEBOX	1KB	Shortcut	04/19/02 22:5...

PLEXTOR CD-R PX-W2410A (F: Bus 0, ID 1)

Item	Size	Last Modified	Attrib...	Pro...	Origin	Start	Len...
01) captain fantastic and the brow...	8,129 KB	8/6/2001 11:17:2...	A	0	C:\mymusic\01) captain fanta...		
01 - Classical Gas-01.mp3	6,625 KB	9/27/2001 11:01:...			C:\mymusic\01 - Classical Gas...	03:1...	03:3...
(am gold 1971) 07 ... - five man el...	4,746 KB	7/29/2001 11:15:...			C:\mymusic\(am gold 1971) ...	06:4...	04:0...
01 - glen gray - in the mood.mp3	5,033 KB	8/26/2001 10:47:...			C:\mymusic\01 - glen gray - i...	10:4...	03:3...
01 - going for the one.mp3	10,063 KB	7/5/2001 11:14:1...			C:\mymusic\01 - going for th...	14:2...	08:3...
07 - artie shaw - begin the beguine.mp3	4,642 KB	9/2/2001 11:40:0...			C:\mymusic\07 - artie shaw - ...	22:5...	03:1...
07 - scarborough fair - canticle.mp3	3,589 KB	2/18/2002 10:52:...			C:\mymusic\07 - scarboroug...	26:1...	03:0...
01 - jan hammer - miami vice theme...	4,070 KB	7/3/2001 11:55:1...			C:\mymusic\01 - jan hammer ...	29:2...	02:2...

Copies: 0 good, 0 rejected
Cycle: 0% done
Cache: 0% full

Type: Information
Time: Wednesday, May 08, 2002 - 10:25:06 AM
Source: UI Manager

Event	Description
246	User name: Steve Smith / MAINFRAME, ID: - Notes: -
246	DiscJuggler v4.00.968-PRO2 (Unregistered edition (writes at lowest speed to 1 recorder only and limits the maximum DVD size to 700MB) Regi
246	Windows NT V5.01.2600

The gauge that marks DiscJuggler's progress stops giving an accurate readout once you pass the official capacity of a disc, so you'll have to guess how much you can stuff in over the 80-minute mark.

order to get a feel for how much you can push these discs.

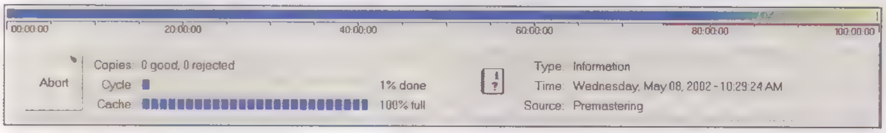
Juggle Your Burning Discs

Like Feurio, DiscJuggler (version 4; www.padus.com) is overburn-friendly, but you need to toggle a few settings first. To make a disc of embarrassingly bad oldies music from MP3s on your hard drive, choose New from the File menu and select the Create New CDs option. In the main window under the CD Recording tab, click the Advanced tab and click the Overburn CD checkbox. Next, choose Options from the Tools menu and click the Defaults tab. In the Miscellaneous section, click the Overburn CD/DVD checkbox.

Once you have set DJ free from its overburn shackles, you can assemble your burning project in the usual way: dragging your MP3s from the hard drive directory onto the CD-R/RW drive directory. Use the Explorer tab in the main window. DJ keeps a rough tally of the CD length both in a visual gauge beneath the file windows and numerically right beneath the drive name you are writing to in the project window. To start recording, go into the CD Recording tab, click the Action box drop-down menu arrow on the right, and set the program to Write or Write and Verify mode. Then click Start. We stuck with an 82-minute disc in our test (using TDK 80-Minute discs), and DJ handled it just fine, producing an overburn that delivered no errors and played without glitches.

Ouch! Careful, That's Hot!

What happens when things go wrong? As we said, there is an outside chance that overburning can damage your CD-R/RW drive, so proceed at your own risk. And even if a disc does burn properly, the overburned portion may suffer from degraded audio. Whenever you finish an overburned disc, test out the last audio tracks it recorded to see whether the audio recorded to the end of the song. Music recorded on the leadout may also contain audio bleeps and other interruptions or fall offs.



Copies: 0 good, 0 rejected
Cycle: 1% done
Cache: 100% full

Type: Information
Time: Wednesday, May 08, 2002 - 10:29:24 AM
Source: Premastering

DiscJuggler's Abort button lets you stop an overburn process if things aren't going as planned.

In our experience, it is best to get yourself a 50-pack of blank CDs. In trying our project under several different CD writing programs and discs from various manufacturers, we killed almost as many CDs as we overburned successfully. The best bet is to overburn modestly, generally to about 90 seconds over the stated capacity of a disc. Otherwise, you risk losing much more than you gain. After all, what is the sense in getting a few more minutes on a CD if the potential downside is ruining the entire disc in the process? CPU

by Steve Smith

In the next installment, we come up with even more silly CD writing tricks: making a bootable CD-ROM rescue disc and writing DVDs to your CD-R/RW drive.

Infinite Loop

Email: The Electronic Salt Shaker

Email has the snail-mail system fighting for its life. An August 2001 Gallup poll showed that 90% of the 150 million Americans who regularly use the Internet think email has improved their lives and that the average user receives eight electronic messages per day at home. Even before the anthrax and pipe bomb scares, this news would have been ominous: In 2001 the United States Postal Service saw only a 0.1% volume growth in first-class volume, the smallest gain in a generation. Perhaps more portentously, advertising mail volume decreased for the first time in a decade. (Can anyone say "spam?") If just one-tenth (15 million) of regular email users had instead sent those eight email messages via first-class snail mail, at 37 cents per letter, the USPS would've garnered $2.96 per person, or $44.4 million *per day*, which ostensibly would have been used to combat the huge $1.35 billion deficit that is projected for 2002.

Sources: Caslon Analytics, Competitive Enterprise Institute, CyberAtlas

WARM UP TO PENGUINS

Customize Your Command Line Login

IN MAY'S ISSUE OF *COMPUTER POWER USER*, WE PRESENTED TIPS FOR NETWORKING LINUX. THIS MONTH, AND IN MONTHS TO COME, WE DELVE INTO MORE LINUX ISSUES and projects. This month, we focus on customizing the command line login.

Power users like to customize their environments. Some users spend hours tweaking their GUIs to get the right shading, move the mouse pointer at the proper pace, or have each action generate just the right sound. In Linux, however, there's much more to system customization than GUI features. For example, there's the command line and the processes running behind the scenes.

One feature that is often ignored is the login process, especially by those who prefer logging in at the command line instead of having their machines boot directly into the GUI. After using Linux awhile, you'll notice certain things you tend to do after logging in. Some of these tasks are administrative; others are just for fun. However, the one thing they have in common is that you can set them up to run automatically at login time. We'll give you some tips for doing so.

The Login Files

We can't predict which Linux distribution you're using, but you're probably using the bash shell. If not, you're probably familiar with bash because it's the default shell in Linux. The bash shell uses a combination of the following files in your home directory to manage the command line login process: .profile, .bash_profile, and .bash_login.

Oddly, different Linux distributions use different combinations of these files. The thing to remember is that the bash login sequence is a constant. When you log in, the login program looks first to /etc/profile, which is the master configuration file. The program then goes to .bash_profile, .bash_login, and .profile, skipping the files that don't exist. We'll assume you use either .bash_profile or .profile and treat them the same. You should be able to apply the following information to /etc/profile, as long as you don't hard code user-specific values.

A Typical Login Profile

A common initial setup for a user's profile is similar to the following (from Red Hat Linux 7.2):

```
# .bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc  ] ; then
  . ~/.bashrc
fi

# User specific environment and start-
up programs

PATH=$PATH:$HOME/bin
export PATH
unset USERNAME
```

A full session on shell scripting could easily require an entire book to do it justice, so we'll instead walk through the pieces of this file.

The lines starting with a hash (#) are commented out. For example, you can have comments start anywhere on the line, but everything after a hash is ignored. Consider this line:

```
x=1 # Sets the variable x equal to the
value 1
```

The bash shell sets x equal to 1, then ignores the hash and everything after it.

Next in our example is the if statement: if [-f ~/.bashrc] ; then. An "if statement" is a conditional clause that tests a value and proceeds to the "then" section if the condition tests true or skips the then section if the condition tests false. In bash, this means a 0 for True and a 1 for False. The square brackets ([]) are a shortcut for the test command (which you can learn more about by typing man test at the command line). The -f instructs the shell to specifically test if the following file exists.

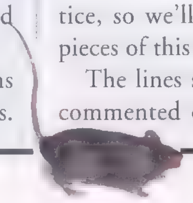
We can read the line as "If the file .bashrc exists in this user's home directory, proceed to the then clause, otherwise skip it." The semicolon lets you have two commands on the same line. This works on the command line and in files. You could alternatively write this same statement as:

```
if [ -f ~/.bashrc  ]
then
```

In the . ~/.bashrc portion of the file, note that there's a space between the first period and tilde (~). The period tells bash you want it to execute the contents of the file that follows. Essentially, this line runs the contents of .bashrc in your home directory, if you have such a file. We don't have space here to fully detail .bashrc, but explore it if the file exists in your home directory. It can be interesting.

The "fi" portion is easy: All if statements in bash end with fi.

Next is PATH=$PATH:$HOME/bin. Variables in all caps in Linux (Unix, too) typically refer to environment variables, which store values utilized by the bash shell.



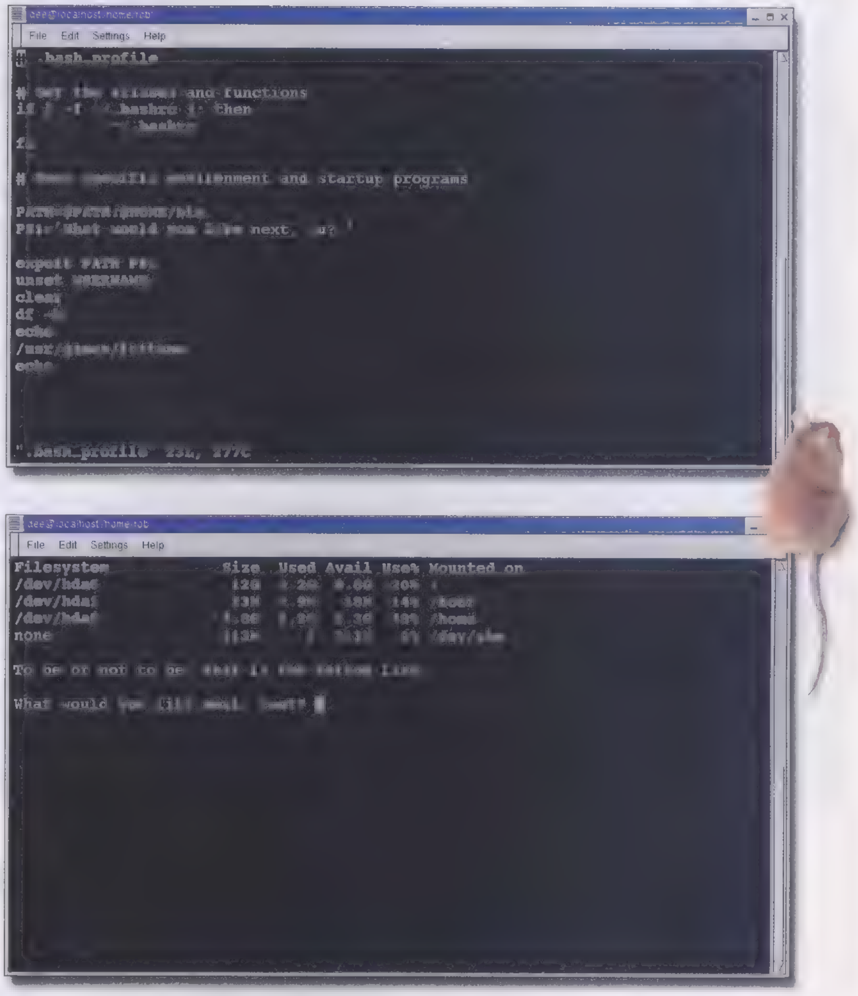
Here, PATH is the variable, and $PATH refers to the value stored in PATH. PATH contains the directories listed in order, which the shell searches when you try to run a program. For example, if we type **echo $PATH** to see what's stored in PATH, we might get something like this: /usr/local/bin:/bin:/usr/bin:/usr/X11R6/bin:/home/dee/bin.

A colon separates every entry. If we type **ls** at the command line to list the contents of the current directory, bash would look in /usr/local/bin and not find it there. It would then look to /bin, where the ls command resides. Having another ls command anywhere else simultaneously means we might not realize that we're running the wrong command (which is why you never put your home directory as the first entry in your PATH; someone could put a nasty version of the same program there and have it take over). To find which program you're running (location-wise), type **which *program*** (replacing *program* with the app you're looking for), such as **which ls**.

The default PATH for this particular Linux distribution is in fact /usr/local/bin:/bin:/usr/bin:/usr/X11R6/bin. The line we're looking at in the profile tacks the last entry to the end, and using the HOME environment variable lets you refer to the location of your home directory without having to hard code it. You'll notice that the new portion begins with a colon, so you don't end up with something such as /usr/X11R6/bin/home/cpu/bin.

Next is "export PATH." To understand this line, you need to know that every time you run a shell script, bash spawns a mini-shell to run within it. When that script ends, all of its settings go away, including the new setting for your PATH. To get around this, use the export feature, which instructs the child shell to share certain values with the parent shell. Each time you add an environment variable setting to your user profile, you must add the export line as well or it won't pass on.

Last is "unset USERNAME." The unset feature wipes out whatever the environment variables following it were set to. So, whatever USERNAME was before, it's nothing now. Don't worry, though. If you type **echo $USER**, you'll see that you already have this information elsewhere.



The images here illustrate a login example we've created. The top image shows the .bash_profile code. The bottom image shows what the login looks like once it is executed.

Customize The Command Prompt

Now that we've detailed a default profile, let's explore what you can do with your login sequence on the command line (which won't make the changes permanent). For example, in Red Hat Linux 7.2, the default command prompt is in the format of [$USER@$HOST basedir], where $USER is the user's login name, $HOST is the machine's name, and basedir is the last part of the current path. For example, if we are in the directory /home/CPU, the basedir is CPU.

The environment variable that stores your command prompt's format is $PS1 (we kind of fibbed about the format). [$USER@$HOST basedir] is written in something you could follow based on what we've already discussed. The actual code for setting this format is: PS1='[\u@\h \W] ‘

The single quotations (') signal that the values within should change according to the current system state. If you use double quotations (") the prompt would not change at all, making it appear as if you never changed directories. The brackets are shown literally, and so is the @. All of the terms beginning with backslashes (\), however, have special meanings. The following list details the most popular codes and what they mean. You can type **man bash** at the command prompt to find the full listing:

- \@—The current time, in the 12-hour format with a.m. and p.m.

- \\—A backslash.
- \d—The date, in the format of Weekday/Month/Day.
- \h—The name of this machine.
- \l—The terminal you're in.
- \n—Advance the prompt down to the next line.
- \s—The shell you're using.
- \t—The current time, in the 24-hour format.
- \T—The current time, in the 12-hour format with no a.m. or p.m.
- \u—The user's login name.
- \w—The full current directory.
- \W—The last portion of the current working directory.

We dislike seeing only a part of where we are, so our preferred prompt setup is: PS1='[\u@\h \w] ', which gives us a prompt like: [cpu@chick /usr/src]

Some users like something more informative and don't mind giving up half their command line to do it. For example, they might use PS1='It is \d at \t, \u, and you are in \w:\n'. Such a command prompt might look like the following, where the cursor waits on the next line for input:

```
It is Tue Apr 23 at 22:08:00 joe and you are in /usr/src:
```

Keep in mind that the displayed date and time aren't going to change until joe presses ENTER. To add these settings permanently, add the PS1 statement anywhere in the profile above the export line, and then add PS1 to the export line, such as:

```
export PATH PS1
```

Of course, you can edit this setup whenever you'd like. You'll have to log out and back in before the changes take effect.

Display System Status Information

Most of us have dealt with a hard drive low on space, if not completely exhausted. In Linux, we're concerned about the entire drive, but also with partitions. If you use a basic setup, such as a boot partition, a root partition, and a swap partition, your major concern is the root partition. The more partitions you have beyond that, the more you need to keep track of. Remembering to do this manually isn't always realistic.

One solution to the storage-tracking problem is including code in your login sequence that automatically shows you how much room is left on all your partitions. Using the df command displays each partition and its usage particulars. Use the –h flag so you don't have to mentally convert bytes to megabytes. Add a line, such as the following, to your logon profile to run this every time you log in:

```
df -h
```

If you want system-performance stats, add a line with just the word "uptime." This displays how long the machine has gone without needing a reboot or shutdown, how many logins there are, and the load average, which are measurements of how stressed the machine is presently, five minutes ago, and 15 minutes ago.

Login Experimentation

Experiment with your login sequence to determine what works best for you. Anything you can put in your login profile also works on the command line, so this is a safe place to experiment before committing anything to a file. In addition, you can always go back and delete bits and pieces later. We typically recommend adding any commands at the bottom of the file to keep things neat. However, the order only matters in a few ways: Let the .bashrc check run first, and place all your environment variable assignments before both the export and unset lines.

If you're unsure of something, try it in any account but the root first. This way you can only put tried and true setups into your root login profile. Also, a popular item to include is fortune, a program included with most Linux and Unix distros. In our Red Hat Linux 7.2 installation, the program is included as /usr/games/fortune. This displays a random bit of humor from a large data file. CPU

by Dee-Ann LeBlanc

The Wonderful World Of Lindows

Home
Join Lindows.com Insiders
How Can You Help?
My Lindows.com
In The News
Lindows.com
Bringing choice to your computer!
Sneak Preview 2
Take a Peek
Join Mailing List
Newsletters, Investor Info, & much more!
Lindows.com Insiders
Link To Our Website
Careers
Interviews
Listen Now!
Michael's Minutes
Microsoft Trademark Lawsuit

Lindows (www.lindows.com) has made a few ripples recently, primarily in its running battle with Microsoft concerning Microsoft's claim that "Lindows" violates the Windows trademark. In the meantime, a second sneak preview of LindowsOS is now available to Lindows Insiders, a group of users who have paid $99 for an annual membership.

The OS' Click-N-Run feature looks to be handy. By joining such Linux tools as Debian's apt-get and Gentoo's Portage, you can download and install software through a single action, in this case by clicking a button in the Lindows Warehouse. Another notable addition is the ability to view and print various Microsoft Office file formats.

Although there are some concerns about the split between Lindows and CodeWeavers (the people behind CrossOver Office and CrossOver Plugin, both of which let people run Windows software under Linux), the folks behind LindowsOS remain optimistic that they'll still release their official product in mid-2002. ▲

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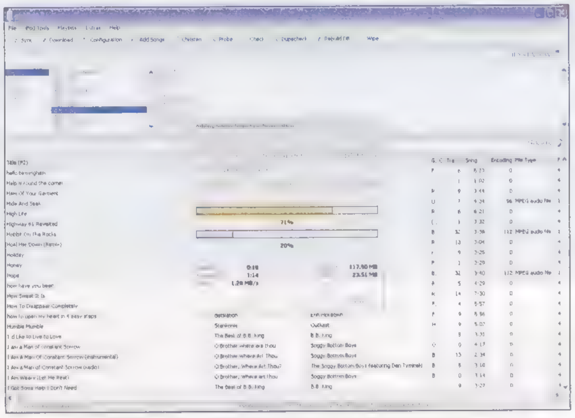
KILLER HARDWARE TIPS

Too Cool To Follow Rules

IF YOU'RE A USER WHO CAN'T LEAVE THINGS ALONE IF THERE'S A CHANCE YOU CAN MAKE THEM BETTER, EVEN IF IT MEANS BUCKING THE NORM, READ ON. WE HAVE SOME TIPS and tricks that just might make you more productive.



Windows users don't have to be shut out of the iPod fun. EphPod lets you load an iPod with music using a Windows PC.

Invasion Of The iPod People

The iPod is arguably the best portable MP3 player ever, but it isn't a one trick pony. Developers are devising ways to extend its functionality beyond playing music.

Panorana iPod Organizer ($20; www.provue.com/ipodorganizer.html) turns an iPod into a read-only PDA. You can send names, phone numbers, appointments, and more from a Mac to an iPod for viewing. K-Lendar ($15 shareware; www.k-lendar.fr.st) is an iPod calendar and appointment-management app. PodNews (free; homepage.mac.com/podnews) downloads headlines, horoscopes, and jokes from the Web.

Apple is also adding contact management features to the official firmware, but hackers are way ahead of Apple.

Griffin Technology (www.griffintechnology.com) has demonstrated PodMate, an infrared transmitter that connects to the iPod's headphone jack, turning the iPod into a universal remote control. The gadget may become a consumer product.

The iPod will probably never completely replace a PDA. Most software add-ons must use a desktop to move data from the Web or a homegrown database to the iPod. For example, downloading Internet Movie Database for iPod (free; www.magma.ca/~sheppard/IMDb/iPod.html) provides a catalog of recently released movies and related information.

The iPod is officially only compatible with Macs, but developers have written tools for Windows, too. EphPod (www.mentaljewelry.org/ephpod/) is a free utility for managing music in an iPod via a Windows PC. Xplay (www.mediafour.com/products/xplay) is a similar product in beta.

"As with any device that is simple and easy to use, the iPod is an attractive target for hacking," says Joe Masters, author of EphPod. "Apple really kept to the KISS principle on this device, and that pays off for developers since we're dealing with well-known entities: standard HFS+ hard drive, standard iTunes database file, standard .VCF format, etc."

EphPod goes beyond basic Apple-approved functionality, letting you add memos and download news from the Web. Masters' fantasy feature list includes weather reports, driving directions, and movie schedules.

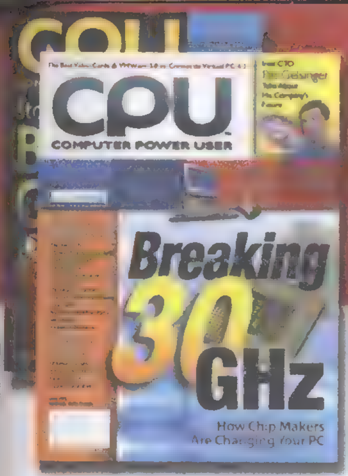
Think Global, Act Local

A friend in Japan sends a DVD with new episodes of your favorite anime, but it won't play in your DVD player. This is no accident. Players sold in the United States won't play discs intended for audiences outside the United States and Canada.

The problem is players and discs are encoded with a region, or data that tells the disc where it should and shouldn't work. Before a player shows even a frame, it compares its programmed region with the disc's encoded region. If the two don't match, the disc won't play. DVDs and players can belong to the following regions:

1. United States and Canada
2. Europe, Japan, South Africa, and the Middle East
3. Southeast Asia and East Asia
4. Australia, New Zealand, Pacific Islands, Central America, Mexico, South America, and the Caribbean
5. Eastern Europe, Africa, North Korea, and Mongolia
6. China
7. Reserved for future use
8. Special international venues, such as cruise ships and airplanes
10. Region-free discs for use in any DVD player

Short of going to Japan, the best workaround is using a region-free DVD player, which is a hacked unit that plays DVDs from any region. Several companies, including Code Free DVD (www.codefreedvd.com) and DVDspecialty.com (www.dvdspecialty.com), sell modified players that play discs from all regions. Expect to pay $150 to $250 more than the street price and the player's warranty to be void.



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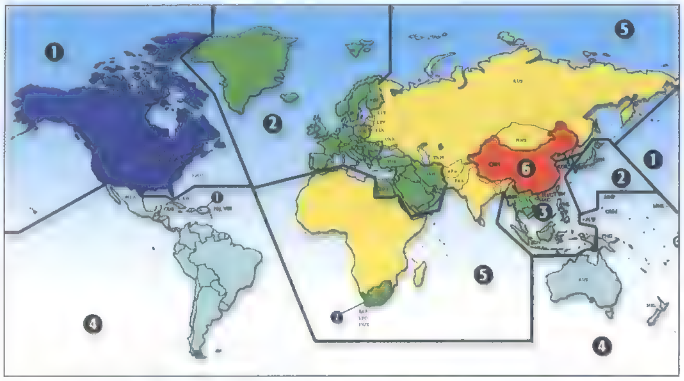


This map details the various regions that DVD discs and players are designed to work exclusively in. Available hacks let you bypass this restriction and watch DVD movies from regions outside the one you live in.

To add multiregion support to a player, visit Region Free DVD (www.regionfreedvd.net). The site offers information on how to hack players. Various methods include firmware upgrades, chipping (installing a chip to override the player's regular behavior), and for many players, typing a secret code on the remote control to unlock the player's single-region fixation.

"Hacking a DVD player by changing the circuitry or firmware is quite difficult. Hacking a player by knowing a secret code is generally pretty easy," says Jim Taylor, author of "DVD Demystified" and the DVD FAQ (www.dvddemystified.com).

You can modify DVD players in three basic ways. The best way is manual region setting, or using an on-screen menu to tell the player the region it should claim it belongs to. Automatic region selection entails the player switching regions on the fly, depending on what it thinks the disc needs. This sounds more convenient but some discs are programmed to intentionally fool such players into selecting the wrong region, making them unplayable. The oldest method, known as Region 0, makes the player attempt to bypass the disc's region check. Few new discs work at all on players with this hack, however. Before installing any hack, know the region-evasion method it uses, its limitations, and how to undo your changes if needed.

Is modifying a player legal? Taylor believes not. "The thing that prohibits a player from being able to play discs from multiple regions is the CSS license," he says. CSS (Content Scramble System) is an encryption system used on most DVDs to prevent piracy.

"In order to get the CSS license, a player manufacturer has to agree to make the player work for a single region. If a manufacturer makes a multiregion player, then they still have not necessarily done something illegal, other than violate the terms of a signed agreement. If someone else, not party to the agreement, modifies the player, then they haven't done anything illegal," says Taylor.

Why are region codes needed? The DVD Copy Control Association (www.dvdcca.org) states, "Movies are often released at different times in different parts of the world. Regional DVD coding allows viewers to enjoy films on DVD at home shortly after their region's theatrical run is complete. . . . Without regional coding, all home viewers would have to wait until a film completes its entire global theatrical run before a DVD could be released anywhere."

Video formats complicate the issue. Even if your player can play European DVDs, your television probably can't display the European PAL video format. Some DVD players will convert to the U.S. standard NTSC signal, however. Other player hacks are possible, too. Region Free DVD lists such hacks as enabling VCD support, disabling macrovision, and exploring files on a DVD.

Speed Demon

There are many ways to measure a computer's speed. Revolutions per minute, however, isn't typically one of them—until now. The PC Tachometer kit from Xoxide ($60; www.xoxide.com/pctachometer1.html) is a hardware hack for people looking for an unusual case mod. The hack adds an analog tachometer dial to your PC, connected via a serial port. The harder the CPU works, the higher the tach's meter points. Using included software, a full CPU load reads 8,000rpm.

You can also scavenge an electronic tachometer from a junkyard and build your own. Xoxide sells schematics and Windows software ($15; shop.store.yahoo.com/xoxide/pctacsof.html).

If you run SETI@home, distributed.net, or other software that keeps your processor usage at 100% full time, staring at a pegged CPU meter might not be very interesting. Write your own software to make that old-school analog meter display network activity, drive capacity, and more.

by Kevin Savetz

Infinite Loop

Prolific Peripherals & Rascally Rodents

As part of its first major OEM contract for mice, Logitech produced about 3,000 mice for Apollo Computers in 1983. In the most recent fiscal year, Logitech sold more than 50 million mice. Yes, mouse popularity has multiplied exponentially, but do mice really multiply like, well, mice? What if Logitech had sent Apollo rodents instead of peripherals? We'd have 189 billion times as many Logitech mice roaming our desktops. Could someone call an exterminator, please?

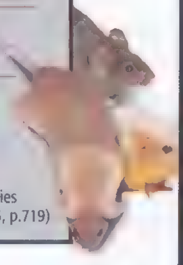
	Logitech's Peripheral Mouse Population	Population If Logitech Had Sent Apollo Rodents
1983	3,000[a]	2,070[c, d]
FY 2002	50,216,202[a, b]	9.5 quintillion (9.5 x 10 ^ 18)[c, d]

[a] Source: Logitech

[b] FY 2002 ended March 31, 2002. Includes retail and OEM sales. This number encompasses only one year of sales, rather than all installed Logitech mice, to more closely resemble the lifespan of rodents.

[c] Source: Assuming a 7% growth rate and exponential rather than logistical growth.

[d] Source: Formula based on the observations of Singleton, Smith & Krebs ("The prevalence of viral antibodies during a large population fluctuation of house mice in Australia." Epidemiology And Infection. v.125, no.3, p.719)



Technically Speaking

An Interview With Dave Orton, President & COO Of ATI

ATI Technologies was a titan in the graphics world in the early and mid-'90s, but it lacked a blueprint for continued success. Benchmarks sagged behind competitors, there were frequent driver problems, and where NVIDIA absorbed intellectual resources from 3dfx, ATI seemingly slowly lost energy.

That started to change in April 2000 when ATI acquired ArtX, a maker of graphics technology for Nintendo consoles. ArtX's CEO, Dave Orton, became ATI's president and COO. In 2000, he not only had to gather in the reins of a new company but also cope with the tech crash that had started a couple months prior.

But by summer 2001, Orton and ATI were ready to unleash the Radeon 8500 chip and prove the graphics market wasn't a NVIDIA monopoly. Today, ATI is stronger than ever. The company owns a dominant market share in mobile graphics processors, fuels the Nintendo GameCube console, is about to debut a family of integrated motherboard graphics products, and is looking to expand into various home and portable devices. According to Orton, his mission with ATI is just beginning. ▲

by William Van Winkle

CPU: What's been your biggest challenge since coming to ATI?

Orton: When I first came into ATI, the first quarter was a very tough quarter for the company. We announced a loss and inventory write-down in our fiscal Q3 of 2000. Digging into that, we found that we had some root issues we needed to work out, both at the technology level and product level. But we had to keep people excited about where we were heading, what was possible, because it's always what's possible in business that keeps people going. Then we had to broaden the management team. It took us nine to 12 months before we started to see some signs of improvement.

Also, there's a second personal part. I live in Silicon Valley and commute to Toronto, so the commuting is always a challenge.

CPU: The All-In-Wonder line has been around for years, but market adoption of this "Swiss Army knife" product has always seemed lackluster. Is this situation changing?

Orton: Well, high-end products in the retail graphics market tend to be niche anyhow, whether it's your highest-end game enthusiast product or the All-In-Wonder. But our vision is that 3D graphics and digital video can come together in a broad range of products. We're taking what we've learned from the All-In-Wonder and we're trying to make it pervasive throughout our product lines. Microsoft has seen the real value of graphics, digital video, and multimedia coming together, which is why they have initiatives like eHome, where they really want to drive those capabilities broadly across the product line and ultimately into their operating system and applications.

CPU: ATI had a history of semi-stable drivers and spotty support. What's being done to ensure strong driver stability and performance that ATI didn't do in past years?

Orton: As you say, ATI had a reputation for drivers not being at the quality level that the industry was looking for. We've invested quite a bit in people and process inside ATI, and one of our key objectives is to push these problems back to the base development teams so that we can really identify not a patch but a root cause and then find architectural approaches to resolve them. Our customer support team has become an extension of the software team so that we can get fast responses and really isolate problems quickly.

CPU: What does it take to achieve 3D graphics that are indistinguishable from a photograph?

Orton: If you look out your window and say, "OK, I want to render all that geometry, all the lighting effects, and accomplish virtual reality," technical analysis show that you need to do 5 to 10 million polygons every 60th of a second. But there are opportunities to go beyond just rendering what's in the window, particularly as you get into the workstation market. It's definitely in the next two to four years that you'll be able to render realistic quality through PC-level graphics. But we don't see that as an end at all because of the complexities of modeling the world.

CPU: How would you define going beyond reality?

Orton: Well, there's visual realism, but another opportunity comes when you look at TV and at PC games and realize they don't look quite the same. In television, which is a video version of reality, you actually have a natural sense of the image over time. You're shooting at one-thirtieth of a second, so you get this concept of motion blur. I think in the gaming industry and in 3D graphics we really haven't mastered the ability to capture the fact that the eye is integrating position over time to create blur as a function of distance and motion. So there are algorithms in that area, as well, both at the application level and probably in the graphics engine. Then I go back to looking beyond the image's surface. The complexities of designing an automobile or an aircraft engine entail much more than just what you see on the exterior. How do you let people dynamically model something or try new versions of an object in real-time? I think these are examples of the unbounded opportunities in this field.

CPU: Many graphics card specs show increasing refresh rates, more transistors, and more triangles per second. How much of this really matters to users and how much is an inconsequential numbers battle between vendors?

Orton: Whether it's gigahertz rates of processors, pixel fill, or polygon rates in graphics, they are real metrics. They translate ultimately into your ability to render a scene faster or at higher quality. I think the challenge in the graphics industry is to continue to define benchmarks that represent something that's interesting to the end user. Polygon fill rate metrics are very interesting for those doing polygon databases. There are other areas where you might actually combine graphics with streaming video or motion video, and there are other metrics that might be more relevant for those kinds of applications. So I think benchmarks are valid. It's a question of how do you continue to balance the benchmarks and recognize that you need to have different kinds of benchmarks for certain kinds of users, whether you're an enthusiast doing games, a multimedia user, or a workstation user.

CPU: Graphics has always been about the desktop experience, but only recently have notebooks come into the scene. Will this trend extend into tablets, PDAs, and other home or portable devices, or is there a point where emphasizing 3D no longer makes sense?

Orton: Even on the PC, there's an opportunity to do more than just 3D, but it does require a visualization engine, an entertainment engine, that basically drives what the user sees. And when you think about handhelds, PDAs, tablets, set-top boxes, there's a huge opportunity there as we go digital and move into high resolutions to bring those technologies into these types of devices. I don't think it's just about 3D. It will be a combination of graphics and media capabilities brought together. Think about the opportunities in a Game Boy Advance today. It's 2.5D today, but over time you're going to see 3D capability there. And as PDAs become more an extension of your environment, helping you attach to the Web and run streaming video, you'll want 640 x 480 or higher resolution and really crisp text. You're going to need antialiasing, decompression, and 2.5D or 3D. So, I think the opportunity is still very unbounded, but you've gotta hit a cost point to make it happen, and compelling applications need to be there.

CPU: The race between the 8500 and GeForce families resembles that of the Pentium 4 and Athlon. Do manufacturers create such rivalries or do consumers force such battles upon them?

Orton: I think that anytime you have strong companies and the market's not growing extremely actively, you end up with much more focus on market share gains. So it's driven by market dynamics and customers as much as anything. When the market's not growing as fast, there's not this opportunity to segment, to pick your area of specialty. Instead, there's more consolidation, and during a phase of consolidation there's a lot of this concept of creating a battle between two companies. Ultimately, it's not just an ATI and NVIDIA battle. There's integrated motherboard graphics, complete with a whole new set of technologies and competition. And then it goes beyond the PC market. We're taking visualization technologies into PDAs, cell phones, set-top boxes, and tablets, so picking new market areas is also an opportunity. But in the base PC market of discrete graphics, there are primarily two major players today, so for that segment there is head-to-head competition.

CPU: What can we look forward to from ATI in 2003?

Orton: 2003? Boy, we're still thinking 2002. I think what people can see coming will be an opportunity to revolutionize what 3D graphics and digital media means to the PC. Our mission in 2002 and 2003 is to make digital media pervasively acceptable. We've talked as a company about taking our technologies and moving into handhelds and set-top boxes, and by bringing these technologies into those new segments, then we'll see what's really possible.

CPU: What's the one message that ATI under Dave Orton projects to the world?

Orton: Particularly in the graphics industry, many people think that once you get on top, if you fall off you're done. That doesn't have to be true. I think the news of our death has been greatly exaggerated. CPU

Under Development

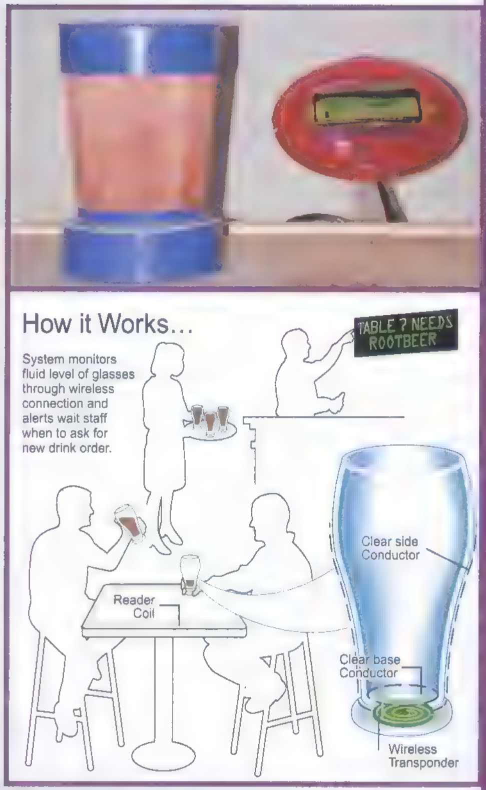
A Peek At What's Brewing In The Laboratory

Fresh from the most influential R&D labs around the world, here's a glimpse at some of the technology that scientists, lab techs, and researchers are cooking up for the future.

Where Everybody Knows Your Glass' Name

You're in a pub with a frosty pint of brew before you on the table. The air is hot, and the chili fries are hotter. At the glass' bottom you notice a funny little disk built into its base. As you raise the glass to order another round, the waitress is already behind you with a new pint in her hand.

Either you have found the perfect pub (with a psychic barkeep) or the establishment is making good use of iGlassware, a simple but brilliant idea from MERL (Mitsubishi Electric Research Laboratories; www.merl.com/projects/iGlassware). The disk houses a tiny processor and a few passive components. A coil in the table inducts power to the glass' coil and creates a data channel between the table and glass. Each glass' sensor can determine the level of liquid present and even discount the presence of ice. When the glass gets close to empty, the table relays the information to the bartender. (Imagine this new technical certification: BNA, short for beverage network administrator.)


How it Works...
System monitors fluid level of glasses through wireless connection and alerts wait staff when to ask for new drink order.
TABLE 7 NEEDS ROOTBEER
Reader Coil
Clear side Conductor
Clear base Conductor
Wireless Transponder

And keep 'em coming–er, never mind. MERL's iGlassware technology, which features smart fluid level sensors inside the glass, should make sure you'll never again pine for a pint.

"iGlassware uses an RFID type system, like what you find on department store goods," says Paul Dietz, principal technical staff member at MERL Cambridge Systems. "Fundamentally, the circuitry will cost about 50 cents, although you still have the labor of embedding the electrodes in the glass."

According to Dietz, the technology will be targeted at midlevel restaurants. Drink refills may sound trivial, but efficient refills can be the difference between a happy repeat customer and a dissatisfied patron who bad-mouths the establishment to friends. ▲

Kick The Reboot Habit

Despite repeated promises that boot times are shrinking with each Windows release, most of us still spend more time than we want to waiting for that first hourglass to disappear. At the heart of this long wait is Windows (and its background apps) loading into RAM. Because PCs use volatile memory, the megabytes loaded into RAM are flushed each time the PC is powered down.

If the sharp minds at Sharp Labs have their way, this time-wasting task will become a thing of the past thanks to a breakthrough that will let RAM hold data after a power drop, much like flash memory. However, Sharp's new thin-film memory technology—exclusively licensed for development from the Texas Center for Superconductivity and Advanced Materials—is roughly 1,000 times faster than flash. The thin-film elements are made of perovskite, a material that can be programmed to alter its electrical resistance. Arrays of millions of such elements would perform the same tasks today's memory modules carry out.

Because the technology is film-based, it will ultimately be far cheaper to mass-produce than today's SDRAM modules are. Moreover, the technology's high speed and low voltage requirements make it ideal in settings where speed, capacity, and mobility are essential, such as next-generation smart phones, PDAs, and notebooks.

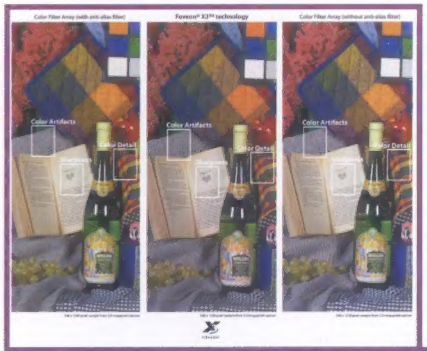
"The main application in the short term will be PCs and Internet servers," says Victor Hsu, director of IC technology development at Sharp Laboratories of America. "This will also be good for embedded memory, such as system-on-a-chip products. We are targeting about three years to market, but we understand this is very aggressive."

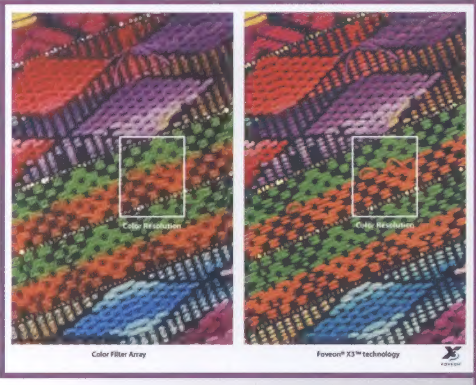
Sharp hopes that the thin-film process will replace conventional nonvolatile memory and today's low-end volatile memory formats, such as SDRAM. Hsu adds, "The number one obstacle we still face, though, is understanding the actual operation of the memory element. We can make it, but we don't really understand what's going on inside the material." ▲

by William Van Winkle

Digital Pixels With Film-Like Clarity

A picture may be worth a thousand words, but viewing a poor quality picture is like straining to understand a thick accent. Current CMOS and CCD sensors in digital cameras gather pixel colors in much the same way monitors display them. Each pixel is made up of three dots (red, green, and blue) packed so tightly that they appear to form a single larger dot, or pixel. In sensors, a green dot registers green by filtering out the red and blue light striking it. In effect, this means the sensor is receiving less light.


Color Filter Array (with anti-alias filter)
Foveon® X3™ technology
Color Filter Array (without anti-alias filter)
Color Artifacts
Color Detail



These images from Foveon detail how the company's X3 technology can dramatically improve the quality of digital photos. X3 entails capturing red, green, and blue light for every pixel. This is compared to other CMOS and CCD sensors that only capture one color per pixel.

Moreover, based on the way most sensors arrange pixels, only 50% of the total dots are green, while 25% are blue and 25% red. Between compensating for these color imbalances and the amount of light screened out by color filtering, a lot of interpolation artifacts can get introduced into images. Sharpness is reduced, color accuracy is skewed, and other odd aberrations can show up under close scrutiny.

Foveon's (www.foveon.com) X3 technology, which just reached the market in February, fixes these problems by looking into the properties of the sensor's actual silicon. Silicon absorbs light at different depths. Specifically, blue absorbs near the top, green next, and red last. By sensing the amount of each color at its specific depth of absorption in the silicon, Foveon lets each dot be a complete pixel, sensing all three colors in one dot with no artificial filtering. Rather than only 25% of the dots registering red, all dots register red, as well as blue and green.

"Current image sensor technology has not enabled digital cameras to realize their full potential," noted Foveon CEO Jim Lau in a press statement. "We believe the breakthroughs of the Foveon X3 technology will form the foundation of a new generation of digital cameras in all classes."

Because the X3 capture method entails far less processing and design complexity, Foveon says its sensors will not only be cheaper but also have higher speeds than current competitors. The company hopes X3 will become the de facto standard in digicam sensors, but Sigma (www.sigmaphoto.com) is the only announced manufacturer using X3. Sigma's forthcoming SD9 is a digital SLR (single-lens reflex) design capable of capturing raw images up to 3.4 megapixels. The camera only supports an ISO up to 400, but one advantage of X3 chips is that by grouping pixels (and so reducing resolution), light sensitivity is increased.

For photo professionals and enthusiasts clinging to film for its superior clarity and color quality, your excuses for not migrating to digital may have just disappeared. X3 chips are based on 0.18-micron CMOS production methods and are currently being manufactured by National Semiconductor. ▲

One Disc, One Terabyte

Today's DVD discs store anywhere from 4.7GB to 17GB. Sure, a dual-layer, single-sided disc can hold as much as 8.54GB, enough for two or possibly three movies, but what about a disc that could hold 120 movies? Japanese startup Optware (www.optware.co.jp) is working in cooperation with MIT and Keisho University of Korea to have a disc and compatible player by the end of 2002 capable of storing 1 terabyte, or about 1,000GB.

Naturally, recording and reading a terabyte of data is no small feat. At 6X DVD speeds (8.31MBps), that's more than 33 hours to read an entire terabyte disc. This is why Optware has also devised a new interface technology capable of achieving 1GBps data transfer rates, a number the company cites as being 1,000 times faster than current technology.

Optware's terabyte discs still use 5-inch media, but the new read/write mechanism is based on digital volume holography originally developed by DARPA (Defense Advanced Research Project Agency), which also helped construct the Internet. Optware's version of this technology is called polarized collinear holography, and it hinges on a new optical medium called magnetic photonic crystal.

As with other holographic systems, Optware's design works by splitting a laser into two beams, a reference beam and a signal beam, which carries the actual data. The signal beam passes through a spatial light modulator, which plots data as a series of dark points on a grid. The dark areas block the signal beam as it passes over the grid, which serves to transfer the pattern onto the photosensitive recording medium behind it. By changing the characteristics of the reference beam, and thus the interference pattern between the two beams, data is recorded in 3D, yielding vastly more capacity than any 2D material. The real innovation in Optware's design is that the signal beam is split into 1 million smaller beams, each of which writes data simultaneously.

Optware hopes to have a write-once mechanism available by year's end, but the technology's development consortium does not foresee disc-based holography becoming commercially popular until roughly 2010. So far, polarized collinear holography is incompatible with today's optical disc formats. ▲

Back Door

Q&A With Jérôme Rota

When Jérôme "Gej" Rota tweaked the MPEG-4 video format to create the more efficient DivX codec, he had no idea that his creation would grow to challenge global leaders such as Microsoft and RealNetworks in the battle for which video codec and DRM (digital rights management) package will be Hollywood's pick for securely distributing movies across the Internet. Urged by California entrepreneur Jordan Greenhall, Rota left his Montpellier, France, home in the summer of 2000. The two set up shop in San Diego and founded DivXNetworks with the intention of reshaping the entire video industry. Today, DivX is a dream format for those who would swap movies across the Internet as easily as MP3 files.

Q How does the DivX codec compare with MPEG-2?

ROTA: DivX is based on the next generation of codec, MPEG-4. Basically, you can expect from four to 10 times better compression with MPEG-4, depending on bit rate, resolution, and so on. You can have DVD quality at 4.5Mbps to 9Mbps with MPEG-2 but only around 600Kbps to 900Kbps with MPEG-4.

Q There has been some concern, even in trade publications, that because of Microsoft's role in developing MPEG-4, you and DivX may be liable for patent infringement.

ROTA: Microsoft does not own everything. They were part of the MPEG community that developed MPEG-4, as 18 other companies are. The MPEG committee defines the standard and writes documents about how you should encode. You use that documentation to build your encoder and decoder, and in the end there is an MPEG entity that collects a license fee. We license the MPEG-4 intellectual property from the MPEG committee.

Q Two or three years from now, what kind of service will consumers use to download movies?

ROTA: We do not want to be the provider of the service. We will be the backbone, the technological enabler providing the codec, DRM solution, and perhaps the network architecture. But we will not provide the interface or Web site for the user. So every customer of ours is free to do his own thing. We want to enable PCs with this technology first, then move to TVs and other devices. That's the main advantage of MPEG-4, its interoperability and scalability. You can rent a movie and watch it on anything from your PC to your PDA.

Q How does DivX's DRM solution compare to others, such as the DRM in Windows Media?

ROTA: There is a lot of difference. First, DivX is totally built with MPEG-4 video in mind. With some of our larger competitors' DRM, the key is stored on the system, so it's very easy to find this key and decode the content. We, on the other hand, have watermarking, encryption—a lot of different kinds of security. One level is in the network itself, another is in the file. When the key is downloaded to the PC, the PC in effect owns the content, not you. You cannot view it on another PC, even if you buy the content. Our system was developed to let you own the content, not your device.

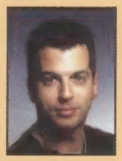
Q But no DRM solution is perfect, right? Somebody will figure out a way to crack your system.

ROTA: Yes, we're very aware of that, which is why we're working hard to stay one step ahead of the bad guys. We actually have a backup plan in place now just in the event that somebody breaks our DRM. We can update the software very quickly in order to minimize the risk.

Q If you could look five years into the future, what do you hope DivX will have accomplished?

ROTA: Five years from now, if everything goes smooth, you'll see DivX in devices everywhere. You would be wearing two or three of them daily, like your cell phone, PDA, and laptop. You might have a set-top box that plays DivX, DVD, and MP3. It does a TiVo-kind of job and can download movies from the Internet. It might go on top of TVs or even be built into them. You might have a video camera that records DivX straight to solid-state memory or a tiny disc. DivX, and MPEG-4 by extension, can really be everywhere you see video today.

For our complete interview with Gej, go to www.smartcomputing.com/cpumag/jul02/rota



William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside of Portland, Ore.

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